This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

HC 2JS3

Digitized by Google

A 11.Y.1912.1

Harvard University

Library of

The Medical School

and

The School of Public Health

Purchased

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

THE MOSQUITOES OF NORTH AND CENTRAL AMERICA AND THE WEST INDIES

BY
LELAND O. HOWARD, HARRISON G. DYAR,
AND FREDERICK KNAB

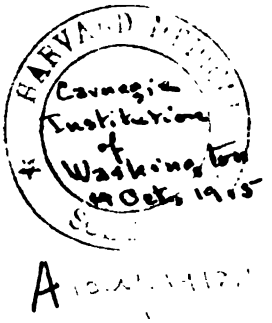
VOLUME THREE

SYSTEMATIC DESCRIPTION (IN TWO PARTS)

PART I

WASHINGTON, D. C.
PUBLISHED BY THE CARNEGIE INSTITUTION OF WASHINGTON
1915

Digitized by Google



CARNEGIE INSTITUTION OF WASHINGTON
PUBLICATION NO. 159, VOL. 3

Copies of this Book
were first issued
OCT 1 1915

The Lord Baltimore Press
BALTIMORE, MD., U. S. A.

Digitized by Google

Digitized by Google

The Lord Baltimore Press
BALTIMORE, MD., U. S. A.

Digitized by Google

SYSTEMATIC DESCRIPTION

PART I

Digitized by Google

Digitized by Google

INTRODUCTION.

According to the conclusions here adopted, the mosquitoes comprise a subfamily of the order Diptera, and are divisible into two tribes. In our region, covering the North American continent from the southern edge of Canada to the Isthmus of Panama, and including the Antilles and Trinidad, we treat in this work 382 species, included in 25 genera: 8 genera with 85 species in the tribe Sabethini and 17 genera with 297 species in the tribe Culicini. To this should be added 7 species recently described but not included here, namely, *Wyeomyia rolonca, Wyeomyia intonca, Aëdes thibaulti* (Dyar & Knab, Proc. Ent. Soc. Wash., xi, 173–174, 1910), *Aëdes ioliota* (Dyar & Knab, Ins. Insc. Menstr., i, 77, 1913), *Lesticocampa espini, Culex prasinopleurus* and *Culex chalcocorystes* (Martini, Ins. Insc. Menstr., ii, 65–76, 1914). Only a few parts of our region have been at all adequately explored, many large areas not at all, so that many more species doubtless await discovery.

Fortunately, an unusually large proportion of the material before us consists of bred specimens with larvæ associated, so that we have been able to base our conclusions upon comprehensive studies of the larvæ as well as upon the adults. The two of the present authors, Messrs. Dyar and Knab, who have made the detailed studies for the taxonomic part of the present work, in fact began their studies with the larvæ alone, thus arriving at an independent view. Further research has abundantly justified these conclusions, although a more extensive study has naturally led to some modifications in details.

We have had prepared mounts of the male genitalia of a large majority of the species and present herewith figures of them; they enable us to draw general conclusions from much more abundant material than has been before gotten together. We find the characters of the male genitalia of the greatest value and supporting the conclusions obtained with the larvæ.

Some confusion in systematic work has been brought about by the employment of certain terms and the worker must be cautioned against them as a source of error in using the original descriptions. It has been repeatedly pointed out by eminent dipterists that the structure commonly called metanotum belongs to the mesothorax; yet the error is being constantly perpetuated. In our descriptions we call the part postnotum. The use of the term metatarsus for the first tarsal joint is not only incorrect but has led to considerable confusion. In such descriptions the second tarsal joint is called the first and so on. In descriptions where neither a metatarsus nor a fifth joint is mentioned it is impossible to decide which joints are indicated.

Concerning species previously described from our region, we have been able to recognize a majority of them in the material before us. Some are still unrecognized and probably unrecognizable, owing to the descriptions having been based upon imperfect material. In a few cases we have adopted arbitrary designations

Digitized by Google

of certain species the descriptions of which covered a number of species and of which the types were not recognizable. All species from our region, whether recognized or not, are treated in the following text.

The two of the present authors who have undertaken the preparation of the systematic portion of the work have not had the opportunity to personally examine the types in European collections, but have been obliged to rely upon descriptions and examinations made by others. For this reason, and from lack of adequate South American collections, we have not been able to recognize certain species described by Theobald from the Guianas and elsewhere, some of which may prove to be the same as species subsequently described by us from Trinidad or Panama.

In the paper above referred to, by two of the present authors, a number of species were described from the larvæ only.[1] With a few exceptions we have now described the adults of these and placed them in our tables in their proper places. Nearly all of them prove to be valid species, distinct from those previously founded upon adults alone.

In questions of priority and synonymy we have followed the code of the International Zoological Congress as elaborated by Dr. C. W. Stiles. While some of the changes in names have been adopted by us with reluctance, it has seemed necessary to treat the subject consistently and to follow the latest authority.

In questions of classification we have adopted the system suggested by ourselves and have not followed the arbitrary systems based on the relative length of the palpi in the two sexes and the scale characters proposed by Mr. F. V. Theobald, nor the subdivisions into numerous subfamilies.

A number of European species have been credited to the American fauna from time to time, but all such cases that we have been able to investigate have proven to be fallacious, the fact being that closely allied and representative species inhabiting the separate continents have been mistaken for each other. We have therefore excluded all European references except in the case of *Culex pipiens*, which we have reason to believe has been actually introduced.

The drawings contained in Volume II of this work, which illustrate the present systematic portion, were prepared by the following artists:

Plate 1 by Miss Mary Carmody, after Circular 72, U. S. Dept. Agr., Bur. Ent.

Plates 2–40 by Miss Carmody from microscopic slides, except the enlarged details on plates 17, 18 and 19, which are by Mr. Frederick Knab from Proc. Ent. Soc. Wash., xi, plates i–iii, 1909.

Plate 41 from photographs by Mr. H. S. Barber.

Plates 42–85 by Mr. Knab from living larvæ.

Plates 86–131 by Mr. Knab, partly inked in by Miss Carmody.

Plates 132-144 by Miss Carmody.

Plate 145 by Mr. Knab.

Plates 146–147 by Miss E. G. Mitchell.

Plates 148–150 by Miss Mitchell, except figures 699 and 713, which are by Mr. Knab.

---

[1] The larvæ of Culicidæ classified as independent organisms. Journ. N. Y. Ent. Soc., xiv, 169-230, pls. 4-16, 1906.

Digitized by Google

MOSQUITOES, THEIR DEFINITION AND POSITION IN THE CLASSIFICATION OF INSECTS.

Mosquitoes are small two-winged flies belonging to the order Diptera. For a general view of this order the student is referred to Prof. S. W. Williston's Manual of North American Diptera, of which the third edition was published in 1908. The following paragraphs, extracted from this work, define the family Culicidæ, and separate it from all other flies:

Flies of a softer texture, not ectoparasites upon warm-blooded animals.
Mesonotum never with a complete V-shaped suture, rarely with any distinct suture. For the most part small flies.
No ocelli.
Antennæ not composed of three joints and an arista or terminal style . . . .
Wings with more than a few longitudinal veins and with apparent cross-veins . . . .
No discal cell.
The marginal vein encompasses the wing; second and fourth longitudinal veins furcate; many veined.
Anterior cross-vein near middle of wing, distinct; second basal cell large and distinct; wings not folded roof-like when at rest.
Wings tomentose; fringed on the hind margin; antennæ of male usually bushy plumose; the second and third veins separate at an acute angle. For the most part blood-sucking flies; mosquitoes.....CULICIDÆ

The wing venation of the Culicidæ is remarkably homogeneous throughout the family. It consists of a well-developed auxiliary or mediastinal vein, six longitudinal veins, of which the second, fourth and fifth are furcate, and humeral anterior and basal cross-veins. The details of structure and their modifications will be found discussed in the chapter on the anatomy of mosquitoes in the first volume of this work.

The Culicidæ, according to Williston, are divided into two subfamilies, separated as follows:

Proboscis short, not adapted for piercing..... CORETHRINÆ
Proboscis much longer than the head, firm, adapted for piercing..... CULICINÆ

The genus *Dixa*, which Williston and others treat as a distinct family, under the name Dixidæ, should, in our opinion, be considered as a third subfamily of the Culicidæ, the Dixinæ.

The larvæ of the Culicidæ are characterized by the presence of a complete, well-chitinized and completely exposed head with well-developed mouth-parts. In nearly all the forms the respiratory system is well-developed and there are two main tracheal trunks extending from the anterior part of the thorax to the eighth abdominal segment. Here the system opens outwardly, either through two spiracles directly upon the dorsum, or, more frequently, through a chitinous tube. The larvæ are therefore metapneustic, all the other spiracles being closed. In further adaptation to the aquatic life the tracheal openings are protected by a variously developed closing mechanism. Pseudopods are absent, except on some

Digitized by Google

of the abdominal segments of *Dixa*. In some of the Corethrinæ the respiratory system is represented by two pairs of air-bladders or "floats." The shape of the thorax, being composed of 3 segments closely consolidated, is a good diagnostic character, except in the Dixinæ. Imms says (Parasitology, i, 122, 1908): In the Chironomidæ "the first three post-cephalic segments become greatly swollen towards the end of larval life, in consequence of the developing imaginal organs contained within them. However, there is no fusion into a compact thorax, though the limits between the second and third segments may become partially obliterated." The presence of long setæ, particularly laterally on the thorax and abdomen, is also characteristic and fails only in a few Corethrinæ.

The separation of the Culicidæ into its subfamilies on larval characters depends upon the presence of the mouth-brushes in the Culicinæ and Dixinæ, which are not developed in the Corethrinæ, besides which in general appearance the larvæ are quite unlike, and an experienced collector will never mistake them. The Corethrinæ are a small group, but possess remarkable diversity of form. All the species known are predaceous, usually upon the larvæ of the true mosquitoes. In general, all the larvæ that seize their prey with the antennæ instead of the mandibles or maxillæ belong to the Corethrinæ. This character is least developed in the genus *Eucorethra* (=*Pelorempis*), but its position may be recognized by the absence of the mouth-brushes. This form, *Eucorethra underwoodi* Underwood, leaving aside its predaceous habit, is near to the generalized ancestor of the Culicinæ, and it is interesting to note its general resemblance to the culicine genus *Anopheles*, which we here place the lowest of the true Culicinæ. The larvæ of the Dixinæ are easily distinguished by having the three thoracic segments not widened and unconsolidated.

The subfamily Culicinæ, or true mosquitoes, are the subject of the present work. They may be divided into two tribes, as follows:

TABLE OF TRIBES OF THE SUBFAMILY CULICINÆ

1. Occiput with a pair of coarse bristles, well differentiated from the setæ along ocular margins, projecting forward at the vertex; mesonotum without setæ on the disk, clothed with scales only except around the margin; postnotum with a group of small setæ posteriorly..... SABETHINI (p. 19)
   Bristles on the vertex present or absent, rarely in a single well differentiated pair; mesonotum usually with two rows of coarse setæ longitudinally across the disk; postnotum usually without setæ, a few forms with from one to three bristles present..... CULICINI (p. 189)

These tribes are also well characterized as larvæ and pupæ:

TABLE OF TRIBES OF THE LARVÆ OF CULICINÆ.

1. Anal segment without ventral brush, the hair tufts all paired..... SABETHINI
   Anal segment with unpaired ventral median brush..... CULICINI

TABLE OF TRIBES OF THE PUPÆ OF CULICINÆ.

1. Abdominal segments 7 and 8 with ample hair tufts at angles; paddles small SABETHINI
   Abdominal segments 7 and 8 with hairs or small tufts; paddles large and broad CULICINI

Digitized by Google

STATEMENT OF SOME OF THE CHARACTERS USED IN THE TABLES.

The Sabethini and Culicini may be separated at once by the presence of a small group of setæ on the posterior portion of the postnotum and of a pair of very coarse bristles projecting forward between the eyes in the former, which combination of characters is absent in the latter. Most Culicini may be recognized by the longitudinal rows of coarse setæ across the disk of the mesonotum, but these fail in a few genera. In the Culicini, the postnotum is usually without setæ, but two exceptions occur. In *Dinomimetes* one or two coarse bristles are present on the postnotum, but its position in the Culicini is at once apparent by the coarse bristles on the disk of the mesonotum. Many specimens of *Hæmagogus* have from one to three minute hairs well back on the postnotum, but the position in the Culicini is indicated by the absence of the two coarse setæ of the vertex. The small setæ on the postnotum are sometimes difficult to see, so that a compound microscope is necessary for certainty, though in the larger forms they are generally recognizable with a hand-lens.

In the Sabethini we separate the genera by the character of the prothoracic lobes, whether large and closely approximated dorsally or well separated; by the proboscis, whether long and slender or short and swollen at the tip; by the eyes, whether large and closely touching on the vertex of the face or smaller and separated by a narrow area of integument, and on the shape of this area, whether wedge-shaped or parallel-sided; on the claws of the hind tarsi, which in one genus have but a single claw, all others having two claws, though occasionally one is reduced in size; by the presence or absence of setæ on the clypeus.

In separating the species of Sabethini, we rely upon the coloring of the scales on different parts. The coloration of the prothoracic lobes is an important character, followed by the distribution of white scaling on the occiput. There is generally a border of white scales behind the eyes, but these may be partly or wholly replaced by dark scales, giving various specific modifications. Next in importance comes the scaling of the wings, whether the scales (particularly on the forks of the second vein) are narrow or broad. Finally, we have the markings on the legs, which are more diversified, but must be used with caution, as they are frequently subject to sexual dimorphism. Care must therefore be used with these characters to be sure of the sex of the specimen under observation, which is not always obvious with the smaller sabethids, as they often have practically identical antennæ in the two sexes. The abdomen is generally colored dark above, silvery below, the colors separated on the sides in a straight line; but in some species this separation is in an irregular or undulating line, affording a useful character. A few of the species have curious, paddle-shaped masses of vestiture on the legs, the distribution and coloration of which afford specific separations.

Digitized by Google

These characters are, we think, easily appreciable by anyone familiar with the names of the parts of the mosquito, and no especial difficulty should be met with in determining specimens of Sabethini that are in good condition, for the specific characters of this group seem well fixed and not subject to much individual variation.

In separating the genera of the Culicini, we have been obliged to resort to special characters for nearly every genus, as they do not divide into large groups of genera on single characters. The Culicini are in a plastic condition, the several forms constituting a more or less continuous series from the lowest to the highest. This is especially shown in the members of the highest genera, particularly the large genus *Culex,* where the species are very closely allied and subject to considerable individual variation. We use, in generic definition, the scutellum, whether distinctly trilobed or not; the mesothorax, whether specially elongated or roundedly elliptical; certain differences in venation; the elongation of the second antennal joint; the approximation of the enlarged prothoracic lobes in one genus; the peculiar shortening of the fourth joint of the fore tarsus in another; finally we come to a group of five genera which we have divided on the modification of the hind tibial scraper. This structure is visible only when the legs have been prepared and mounted in balsam, but we find it a good character of last resort.

The five genera in question are *Psorophora, Aëdes, Mansonia, Culex* and *Carrollia. Psorophora* and *Aëdes,* in the female, can be distinguished at a glance from the others by the shape of the abdomen, which is pointed, with prominent cerci, and in nearly all cases this will suffice, as specimens are generally of the female sex. The small genus *Carrollia* can be distinguished from *Culex* by the compressed abdomen. The *Mansonia* are generally recognizable by their specific characters, but in cases of doubt recourse should be had to the tibial scraper, which can be seen by mounting one hind leg for the microscope.

Lutzia is closely allied to *Culex,* but we separate it by the unusually large empodia between the tarsal claws. This is no doubt an adaptive character of no fundamental importance, but serves to separate these large species. To separate *Psorophora, Aëdes* and *Mansonia,* we have been obliged to use different characters for the two sexes, which is the only case in which we have been forced to this undesirable course. It has seemed impossible to unite the last two genera on account of the peculiar larval structures of *Mansonia,* as well as the structure of the female adult, correlated with its habit of depositing the eggs in boat-like masses.

We have separated the species of *Deinocerites* by the structure of the cerci of the female, which can only be well seen in balsam mounts. The antennæ of the male serve in part to separate specimens of that sex, but in doubtful cases, with only males at hand, the geographical distribution will have to be considered in arriving at a determination.

In *Culex* we have used the coloration and markings of all the parts. The genus contains two distinct groups, *Culex* proper and the peculiar group inhabiting the water in the leaves of bromeliaceous plants, *Microculex* Theobald. These

Digitized by Google

species always possess two peculiar dark bars on the pleuræ, but as some of the members of *Culex* proper have irregularly marked or spotted pleuræ, we have thought it safer not to separate the group on this character, but have included the species with the others. The species of *Culex* are the most closely allied and the most variable of any of the mosquitoes. We have been obliged to use the ordinary characters of markings and coloration, because other characters do not exist; but there are none of them that are not subject to variation. For example, the white ring on the proboscis of the female may, in occasional specimens of the same species, be absent; the white rings of the tarsi may, exceptionally, disappear; the markings of the thorax, more especially if pronounced and obvious, may be replaced by a uniform coloration; the white bands at the bases of the abdominal segments may be absent. We have tried to offset this condition by including some of the more variable species in two or more different places in the table; but, in using it, this matter must not be lost sight of, nor the conclusion hastily reached that a specimen represents a "new" species simply because it can not be determined by the table. The larval table will be found to be more reliable, as the larval characters are less variable than those of the adults; indeed a knowledge of the larva is essential to a proper comprehension of a species of *Culex*.

Before leaving this subject reference should be made to the character of the shape of the proboscis, which we use under dichotomy 45. While often obvious, the difference in certain species is slight, so that it is sometimes difficult to decide whether the proboscis is swollen or not. In such cases we advise the trial of the table under each heading separately. In short, the species of *Culex* in their colorational characters are illy defined, intergradient, and variable, and if our table is found to be vague and the characters inconstant and unsatisfactory, the fault must be laid at the door of the insects themselves. The variability of the specific characters does not imply that the species are not distinct. Their distinctness is proved by the well-marked differences in the male genitalia, which we find to be reliable, and the same can be said of the larvæ.

The species of *Uranotænia* are few in number and beautifully ornamented, lending themselves to specific separation on the usual characters of markings and coloration. The species seem constant and we do not anticipate that there will be any difficulty in recognizing specimens in good condition. Unfortunately the same is not the case with the larvæ which present few tangible characters for separation. Mitchell published a table separating species on detailed characters of the structures of the antennæ, which was followed by Dyar and Knab; but we now find that these characters are not only beyond the limit of specific fixity, but also beyond the limit of accuracy of observation, so that we have had to discard them entirely.

The species of *Culiseta* are well defined and will cause no trouble, once the genus is ascertained. This is in some cases more uncertain than the specific determination, owing to variability in the venation, which affects some of the species more than others. The larvæ are more difficult to separate than the adults, although very readily determinable generically. Indeed, we feel some

Digitized by Google

doubt whether the characters used to separate the larvæ specifically are actually reliable, but we give them for what they are worth.

The species of *Mansonia* are, for the most part, easily separable on characters of coloration. Of the larvæ, we know only two species as fully grown larvæ, so that we have been unable to make a full synoptic table of them.

The species of *Psorophora* divide on the presence or absence of smooth nude areas on the mesonotum, on the presence or absence of a tooth on the tarsal claws of the female, on the characters of the vestiture of the legs and the coloration of the legs and body.

In *Aēdes* we use as the primary character the presence or absence of a tooth on the tarsal claws in the female, followed by characters of coloration that require no special explanation. The species of *Aēdes*, as a whole, are less subject to variation than those of *Culex*. There are, however, certain species which vary extremely in the scale-ornamentation of the mesonotum and abdomen. In several cases the adults are practically identical and no certainty of separation can be had without a knowledge of the male genitalia or early stages. Such species we have separated by geographical distribution, where possible. Specific variation is most marked in the ornamentation of the mesonotum, but even here is scarcely great enough to cause confusion. We anticipate that our table will be available for material in good condition.

The species of *Hæmagogus*, though few in number, separate into two groups differing in venation, armature of the claws of the female, and length of the palpi of the male. Generic names have been proposed for these divisions, but seem unnecessary. The species further separate on the amount of silvery marking on the abdomen, which is somewhat variable and more abundant in the males than in the females, so that a little care must be exercised in considering this point. In the species with short male palpi minute bristles occur posteriorly on the postnotum; but these are often absent, so that they can not be used even for specific diagnosis.

The species of *Megarhinus* are separable by the presence or absence of red anal tufts and the coloration of the mesonotum and legs. The latter is subject to sexual dimorphism, so that a separate table for the determination of the two sexes has been found useful. The species are well fixed and the larvæ nearly allied, but separable on good characters.

The *Anopheles* separate on the coloration of the wings, legs, and palpi. Some of the species are closely allied to each other and the markings on the wings present some variation, but not so as to call for special comment. The larvæ have proved for the most part practically inseparable, except on minute characters; the dentition of the lateral comb has proved to be variable.

Besides the tables for adults, we also give tables by the male genitalia and by larvæ.

The male genitalia do not separate the tribes Sabethini and Culicini. In the Sabethini, the genera separate broadly on the modification of the clasp filament, which is simple in the more generalized forms, but the characters do not define the genera separately. In *Wyeomyia* (including *Limatus*, *Sabethes*, and *Sabe-*

Digitized by Google

thinus) the species separate on the shape of the side-pieces and the form of the clasp filaments; next the degree of reduction of the filament, which in some forms becomes functionally replaced by the produced outer angle of the side-piece; then the details of the structure of the modified and lobed clasp-filament, and in some cases by the shape of the harpes. In *Lesticocampa* and *Joblotia,* the basal appendages express the first dichotomy, followed by modifications of the side-pieces and harpes. The structures which we call harpagones in the descriptions of the genitalia are not homologous with what we call harpagones in the Culicini, being here more like a second pair of unci. But they occupy a similar position, and it appears to us more likely to cause confusion if a separate term were employed.

In the Culicini, the genitalia show a wider range of structure and are largely available for generic definition. Harpes and harpagones are absent in the lowest

A. Side-piece.
B. Clasp-filament.
C. Lobes of side-piece.
D. Harpe.
E. Harpago.
F. Uncl.
G. Basal appendage.

forms, the harpes appearing first. The presence of lateral appendages to the side-pieces separates the genera allied to *Deinocerites* and *Culex,* except for a few aberrant forms; *Mansonia* is characterized by a rod or tooth set in the end of the harpagone; *Psorophora* by another modification of the harpagone, and *Hæmagogus* by a fringe of large scales on the side-pieces. A few aberrant forms come out separately in the table. In the *Deinocerites* group, the species separate by small details. In *Culex,* after separating the aberrant *dyari* and *melanurus,* the species separate broadly on the modifications of the lateral prominence of the side-piece, the shape of the harpes, and lastly the fine divisions of the harpagones. These serve for minute specific characters, but have not been carried out to the final details in the tables, largely for want of time for the minute comparative study. They are indicated, however, in our figures, to which reference

Digitized by Google

is made in parts of the table. In *Culiseta,* the presence or absence of a row of spines on the segment preceding the last gives a good prime character. Afterwards the modifications of the unci are used. In *Psorophora,* the dilation of the clasp-filament and the modifications of the appendages of the harpagones are the principal characters. In *Aëdes,* the harpagones are undeveloped in the lowest forms; the other characters used are like those already mentioned. In the succeeding genera, the characters for use become more and more restricted, until in *Megarhinus* the species only separate into groups. In *Anopheles,* the harpagones and harpes are both absent, and recourse is had to certain spines and lobes, which are without fundamental importance, but serve for the most part for a specific separation.

The larvæ, as elsewhere stated, separate into the tribes Sabethini and Culicini on the absence or presence of the ventral brush on the last segment. The ventral brush of the Culicini consists of a series of branched hairs inserted along the mid-ventral line, each hair or tuft upon a transverse chitinous strip. These chitinous strips form the so-called "barred area"; in a few cases this is supplanted by a chitinous plate with a longitudinal series of perforations in which the members of the brush are inserted. The ventral brush is rudimentary in the first-stage larvæ and becomes more complete at each successive stage. In the Sabethini the ventral brush is absent in all stages and is represented by a single opposed pair of hairs or hair-tufts. In addition to this character, a number of others, structural and biological, differentiate the two tribes. These have been set forth in their respective places in the discussion of the tribes.

In the Sabethini, the genera separate well, except *Wyeomyia* and *Limatus,* which are in fact not truly separate genera. There is no lateral patch of scales or comb on the eighth abdominal segment in *Joblotia.* The predaceous *Sabethinus* and *Lesticocampa* have heavily armed maxillæ and separate on this character from *Wyeomyia* and *Limatus,* which feed on organic matter and microörganisms. In most of the sabethine genera we possess too few larvæ to form extensive tables. In *Wyeomyia,* however, we have a number. They separate on the structure of the air tube, the lateral comb and other structures requiring no especial explanation.

In the Culicini, the genera separate on the absence of the air-tube in *Anopheles;* afterward by the presence or absence of pecten on the air-tube, the structure of the mouth-brushes, the shape of the head, mandibles, and the completeness or incompleteness of the chitinous ring on the anal segment. The specific characters of the larvæ will be easily understood from the wording of our tables, and require no especial explanation.

Digitized by Google

OUTLINE OF THE GEOGRAPHICAL AREA COVERED.

The region included in the present monograph extends over North and Central America, from southern Canada to the Isthmus of Panama, including the West India Islands and the island of Trinidad. The Arctic portion of North America, Labrador, the Hudson Bay region, northern Saskatchewan, northern British Columbia, and Alaska are excluded, owing to the fact that no sufficient material was obtainable from this region with the time and means at our disposal. We regret this necessary omission, as the Arctic is known to be well inhabited by mosquitoes, and should undoubtedly yield a number of interesting species. Our collections cover southern Canada from the Atlantic to the Pacific more or less completely, the United States, parts of Mexico, small collections from several points in the Central American states, and fairly complete collections from the Panama Canal Zone. The mosquitoes of Jamaica have been made known through the efforts of Dr. M. Grabham, and we have less representative material from Cuba, Santo Domingo, and some of the smaller islands. The island of Trinidad has been included, although it does not properly belong to the same faunal region with the other West Indies, having a continental fauna. Its species are more nearly allied to those of continental origin occurring in Panama, many being identical. These two regions lead insensibly into the South American fauna, which should properly be included in a work of this character, but we have not had the opportunity to acquire sufficient material from the southern continent.

Many portions of our territory are very inadequately covered by the collections before us. Mexico presents many still unexplored regions, while the Central American states are most imperfectly known to us. This is partly compensated by our comparatively good collections from the Panama Canal Zone, as many of these species undoubtedly range further to the north; still there must be many undiscovered species in this territory, and we expect to see the list of species considerably extended by further research. Unfortunately we have no material from the island of Santa Lucia, whence Mr. Theobald received considerable collections, nor from St. Vincent, whence Professor Williston described several species. Consequently we have been unable to recognize several of these species in the material before us; since many of the West Indian species are peculiar to certain islands it would be unsafe to identify from one island a species described from another without authentic material for comparison and a knowledge of the larva, even in cases of apparent agreement with the description. This is more particularly true of members of the genus *Culex*, many of which are closely allied to one another, and appear to be recently evolved or plastic forms, which lend themselves to geographical diversity, shown, perhaps, only in the larval stages and in the structure of the male genitalia.

Digitized by Google

We have referred above to faunal regions, or large areas occupied by a complex of species which, in general, do not extend beyond these areas. Such areas exist for all classes of plants and animals and, in a broad way, coincide for all. They have been mapped for North America in some detail by Dr. C. Hart Merriam (U. S. Dept. Agr., Div. Biol. Surv., Bull. 10, 1898). These areas differ somewhat for different classes of animals. In many they are conditioned by the distribution of food-plants or other hosts, but, in mosquitoes, these restrictions operate to only a slight degree, and, in consequence, the faunal areas of mosquitoes are large. They are determined by climate, or rather by the effect of climate upon the breeding-places. As we show elsewhere in this work, there are classes of species adapted to breed in temporary puddles, in permanent water, and in water held by living or dead plants. The former are of two kinds, those occurring in pools the temporary nature of which is determined by a cold climate, where the melting snows form pools in early spring, and those occurring in pools formed by infrequent rains in an arid region. The species inhabiting permanent water are especially adapted to a moist climate where frequent rains maintain suitable collections of water. The last class are dominant in the tropics, where many species of plants retain water in leaf-axils or flower-bracts. A few species are associates of man, their larvæ inhabiting water in artificial receptacles, and these are largely independent of faunal regions, being limited only by extremes of cold and the absence of man.

The area covered in this work does not correspond to any one or more entire faunal regions, its boundaries being arbitrary. The species of the arctic region are treated in small part only, in so far as we find them in Canada and the northern parts of the United States. The faunal regions comprising the United States east and west of the Rocky Mountains are included in full, as is also that of the semi-arid west, although our collections from the south-western United States and the Mexican plateau are very scanty and, consequently, that part of this area is imperfectly treated. The great tropical faunal region is touched by our inclusion of Central America and of Trinidad, while the insular faunas of the Greater and Lesser Antilles, which form two distinct regions, are covered entirely, although necessarily incompletely.

Digitized by Google

HISTORICAL SKETCH OF THE CLASSIFICATION OF MOSQUITOES.

Linnæus in 1758 founded the genus *Culex,* containing several species, some of which are not now considered to belong to the Culicidæ. The first species contained in Linnæus's genus is *Culex pipiens* Linnæus, now generally recognized as the type of the genus and the family. From time to time new species and genera were added by various authors. Meigen proposed the genera *Anopheles* and *Aëdes* in 1818. *Culex* was restricted to the forms with long palpi in the male and short palpi in the female; *Anopheles* was separated from *Culex* by the long palpi of the female, *Aëdes* by the short palpi of the male. He was followed in 1827 by Robineau-Desvoidy, who adopted the genera of Meigen and established three new ones, *Sabethes, Megarhinus,* and *Psorophora,* without reference to the characters used by Meigen. *Megarhinus* was founded on the curved proboscis and narrow wings; *Sabethes* on the ciliate tibiæ and tarsi of the middle legs; *Psorophora* was founded, not as is generally supposed on the ciliation of the legs, but upon the structure of the prothorax, which, however, offers nothing peculiar or tangible, and the supposed presence of ocelli. These genera were for the most part rejected by subsequent workers as insufficiently founded.

In 1881 Lynch Arribálzaga recognized all the previously established genera and in addition proposed the genera *Ochlerotatus, Tæniorhynchus, Janthinosoma, Heteronycha,* and *Uranotænia.* He separated his genera principally on the number of joints in the palpi and the armature of the claws in the two sexes, in addition to the previously used characters. Owing apparently to some misidentifications of species or other error, his definitions of *Culex* and *Aëdes* are wrong, and there are several errors in his table, so that many of the genera are not tangibly defined. In 1896, Williston proposed the single genus *Hæmagogus,* the palpi short in both sexes and said to be five-jointed.

The discovery of the rôle of mosquitoes in the transmission of disease at once produced great activity in the study of these insects. It was early found that not all species of mosquitoes transmit disease and it was only natural that there should have been a desire to express in classification the differences which were so significant from a pathological standpoint. These differences were obvious and seemed very significant when only a few forms were studied, but with the widening of the field this preoccupation brought about a highly artificial system of classification.

Grassi assisted by Noé, in 1901, in his "Studi di uno zoologo sulla malaria," divided the mosquitoes into two subfamilies, the Anophelinæ and the Culicinæ, leaving out of consideration certain genera which were unknown to him. The Anophelinæ were defined by the long palpi of the female, the presence of a single

Digitized by Google

spermatheca, the very long legs, the absence of scales on the abdomen, the adaptation of the larva to life at the surface of the water, and the character of the eggs. The Culicinæ were characterized by the short palpi of the female, the presence of three spermathecæ, the stout legs, the scaled abdomen, the larvæ provided with respiratory tube and living below the surface of the water, and the eggs placed vertically in a boat-shaped mass.

In the same year Theobald, commissioned to study the collections of the British Museum, divided the Culicidæ into five subfamilies, Anophelina, Megarhinina, Culicina, Aëdeomyina, and Corethrina, thus raising the genera that had been previously established on characters of palpi and proboscis into subfamilies (Journ. Tropical Medicine, v. 4, pp. 229–235). In this paper he proposed the following new genera, without, however, associating any species with them: *Cyclolepteron, Toxorhynchites, Stegomyia, Panoplites, Deinocerites, Brachiosoma, Aëdeomyia, Wyeomyia, Trichoprosopon.*

In 1901 appeared the first volume of Theobald's monograph of the mosquitoes of the world, based upon extensive collections brought together through the agency of the British Museum. In this work Theobald elaborated his classification; he included the characters previously used, extended the use of venation and scaling introduced by Arribálzaga; but he also employed the presence or absence and shape of the scales on different parts of the body and wings. A new character, the presence of setæ on the postnotum was here first introduced by him. Upon the presence of these setæ on the postnotum, and a few scales in addition, be founded the subfamily Trichoprosoponina. He proposed the new genera *Mucidus, Eretmapodites,* and *Armigeres,* to which he added, in a second volume, *Brachiomyia* and *Limatus* in the same year. Several of Theobald's names proved to be preoccupied, and substitutes were promptly proposed by R. Blanchard.

In 1902, Neveu-Lemaire proposed a classification based on the number of joints in the palpi, similar to that of Arribálzaga, but with more detail. He proposed the new genus *Theobaldia,* based on these characters. In this year Theobald published a classification of the "Anophelina" in which the genera *Grassia, Howardia, Rossia, Cellia,* and *Stethomyia* were created. All but two of these names proved to be preoccupied and Blanchard again proposed substitutes.

In 1903 the third volume of Theobald's monograph appeared. In this the classification on scale characters was further elaborated and the number of genera greatly increased. The old genus *Anopheles* is here divided into 10 genera, based entirely upon vestiture characters. He added 6 new genera to the Culicina and 12 new genera to the Aëdeomyina. He established a new subfamily, Heptaphlebomyina, for a new genus and species from Africa. In 1905 Theobald published a review of the genera in the "Genera Insectorum" which is in line with his previous work and brings the classification up to date. He separated his subfamily Megarhinæ into two subfamilies on the character of the length of palpi of the female. Theobald's volume IV (1907) and volume V (1910) of his monograph added many new genera and species, all based on modifications of the characters already adopted by him.

Digitized by Google

Lahille proposed in 1904 a classification founded on the same characters formerly used, the proboscis and palpi, also adopting some of Theobald's scale characters. He introduced in addition a new character, the narrowing of the wing and the consequent shortening of the forked cells, as indicating specialization for rapid flight. He adopted two tribes, based on the presence or absence of a long proboscis, the Corethrinæ and Culicinæ. The latter he divided into three groups, founded on the length of the palpi, the Macropselaphes, Heteropselaphes, and Micropselaphes. Each of these groups contained two subtribes, characterized by wing differences; these differences he expresses in the terms Protopteres and Teleopteres. Thus the Lynchiellina (*Lynchiella* proposed as a substitute for *Megarhinus*) are supposed to be derived from the Anophelina, the Toxorhynchitina from the Culicina and the Uranotæniina from the Aëdina.

In the same year Lutz (in Bourroul) offered a new arrangement in which the order of importance of the old characters was shifted. After removing the Anophelinæ and Ankylorhynchæ (Megarhininæ) he, for the first time, employed consistently the character of the presence or absence of setæ on the postnotum of the mesothorax, formulating two groups, the Metanotopsilæ and the Metanototrichæ. In consequence the character of length of palpi is employed secondarily and repeated in the two groups under the names Heteropalpæ and Micropalpæ. In addition a number of new genera and two new subfamilies, Hæmagoginæ and Dendromyinæ, are proposed. His general scheme was the nearest approach to a natural classification so far reached, and a great advance. It was adopted by Theobald in the fourth volume of his monograph (1907), without, however, coördinating his many previously established genera.

In 1904 Felt redefined certain genera, largely on the basis of the male genitalia, and proposed some new generic terms. In 1905, Dyar continued the classification of Felt and proposed some additional names. Early that year Dyar separated the forms with short proboscis as a separate family, Corethridæ, and included in it the genus *Dixa,* the position of which had, until then, been considered uncertain. Independently Eysell, also in 1905, considered the Culicidæ and Corethridæ to represent separate families and further elevated the Anophelines to family rank, as Anophelidæ. The corethrid forms were already excluded by Blanchard in 1900, and the family Culicidæ restricted to the forms with piercing mouth-parts; in this he was followed by several authors. It is said that Rondani, already in 1856, established the family Corethridæ.

In 1906 Dyar and Knab published a classification founded upon larval characters, the adult not being taken into consideration. A number of new generic and specific names were proposed. The paper marks a departure from the old methods in that the historic adult characters were first definitely abandoned. In the same year Christophers published on the larvæ of mosquitoes, however, without a definite classification. He proposed a new genus, *Jamesia,* for certain predaceous larvæ. Mitchell, in a paper on the mouth parts of mosquito larvæ, gave great importance to the modifications of the larval mandibles and maxillæ and raised the genera *Deinocerites* and *Psorophora* to subfamily rank.

Digitized by Google

Early in 1906 Coquillett published a paper in which the genus *Culex*, as generally understood, was divided on a scheme based on characters of scales, of coloration and of the female claws. Two new genera are proposed. Later in the same year Coquillett published a classification of the American Culicidæ which attempted to harmonize the generally accepted ideas of the classification of the imagos with the new facts brought out by others in the study of the larvæ. The palpi as a primary basis of division are definitely abandoned, the presence or absence of lobes on the scutellum forming the first division, and the subfamily Aedinæ is discarded. Coquillett recognized seven subfamilies, Anophelinæ, Megarhininæ, Psorophorinæ, Culicinæ, Deinoceritinæ, Uranotæniinæ, and Trichoprosponinæ. He also added several new genera.

In 1907 Theobald's fourth volume appeared. He excludes the corethrine forms but otherwise adopts Lutz's modification of his classification. Ten subfamilies are recognized with 104 genera. The characters of the subfamilies are essentially those given to genera in the first volume; the characters of the genera are now based almost wholly upon modifications of the vestiture, in some cases on peculiarities present only in one sex. The palpi are utilized as a primary character and in consequence, where only one sex was known, the position of the insect was assumed. An attempt is made to restrict the genus *Culex* on genitalic characters, but it is not carried out consistently and the genus is left as a recipient for miscellaneous residue. Other inconsistencies appear, which add to the inherent difficulties of Theobald's classification.

Dyar and Knab published in this year a classification based on adult characters, excluding all secondary sexual characters and all founded upon the vestiture, recognizing the Corethrinæ and Culicinæ as subfamilies and dividing the latter into two tribes, Culicini and Sabethini. In 1908, Williston, in the third edition of his "Manual of North American Diptera," adopts this classification. A modification of this classification is employed in the present work.

In 1908 a work by Peryassú, on the mosquitoes of Brazil, appeared. It followed closely the classification of Lutz as elaborated by Theobald. Two new genera and a number of new species appear. The systematic part is followed by chapters on the larvæ, biology, and kindred subjects. Here the subfamily Stegomyinæ is created on larval characters and the following genera included in it: *Stegomyia, Carrollia, Stegoconops, Gualteria, Hæmagogus,* and *Bancroftia.*

In addition to the works discussed many genera have been founded by different workers who have very generally accepted the Theobaldian classification, often even exceeding him in the differentiation of scale characters. It is not necessary to enumerate these here. It should, however, be pointed out that the differences in the interpretation of the terminology of scale characters has caused great confusion and much burdensome synonymy.

Mention should be made of some works which, while they have not contributed new ideas on classification, are nevertheless important. In 1900 appeared Giles's "Handbook of the Gnats or Mosquitoes." It marks an epoch in that it was the first attempt to bring together the knowledge of the mosquitoes of the world. Of necessity it was largely a compilation, but it contains identification tables

Digitized by Google

and much valuable information. In 1902 Giles published a second edition of his work and in this the classification was adjusted as far as possible in accordance with the Theobaldian views. In 1904 he published "A Revision of the Anophelina" which follows closely the scheme laid down in Theobald's third volume.

In 1905 Blanchard published "Les Moustiques," which brings together in most convenient form our knowledge of mosquitoes up to that time, both from the systematic and the medical and economic sides. It contains a very complete bibliography and on that account is a most invaluable work. The classification followed is that of Theobald, but set forth much more clearly than by its author. There are many emendations and changes in nomenclature in accordance with the laws of priority.

In conclusion, some remarks as to the merits of the different systems of classification seem called for.

It is generally agreed that the best classification of any group of animals is a natural one; that is, one that agrees with the phylogeny of the group. To determine what characters are natural ones in this sense, considerable experience is required, not only with the group under study, but with characters of insects in general. No single set of characters should be used, but the subject approached from all possible points of view. There are certain general principles that must not be violated. For example, generalized forms must not be derived from specialized ones, and this will apply to special organs and to any stage of the insect. Superficial characters, or those that are readily affected by adaptation or specially useful to the insect, should not be made the basis of fundamental divisions. Characters that appear in one sex only are undesirable to use. These represent, as Williston says, evolutional instability; for it often happens that a modification of an old character will appear in one sex first, and be gradually transferred to the other sex. Therefore where characters, not primarily related to reproduction, differ in the sexes, it may be considered that such species have not reached equilibrium, and the use of their characters for groups higher than specific is not warranted.

Viewed from this point, it must appear that the classification of the mosquitoes has pursued a vicious course from the beginning. The first separation of genera by Meigen was based on secondary sexual characters; the second separation, that of Desvoidy, made use of superficial adaptational characters of vestiture, thus violating from the beginning the principles above laid down. Arribálzaga continued in the same course, adding to the undesirable list other more detailed, and therefore more objectionable, characters of a secondary sexual nature. Meigen's introduction of the relative length of the palpi in the two sexes was particularly unfortunate. It was based upon a very few forms and indicated in the most superficial way, and more than anything else hindered a more exact study of the Culicidæ. In fact no attempts to understand the palpi of the different forms structurally were made until very recently by Neveu-Lemaire (1902) and Felt (1905).

Digitized by Google

Theobald's extensive monograph was based essentially upon the work of his predecessors. He brought forward the excellent character of the presence or absence of setæ upon the postnotum, but did not rank it sufficiently high. He studied carefully the shape and distribution of the scales, and came to depend more and more largely upon them as the principal character in the separation of genera. Wiedemann, Loew, and Williston rightly discarded Desvoidy's genera *Psorophora* and *Sabethes* as being founded upon superficial characters of vestiture. The same objection, only with increased force, applies to all the genera founded on scale-characters. We now recognize *Psorophora* and *Sabethes* on other characters, but this does not invalidate the principle laid down above that superficial adaptational characters should not be made the basis of generic definition. They are of specific value only. It is true that these characters may in many cases show true affinities, but discrepancies would not become apparent to a student working with only one set of characters. Nevertheless discrepancies are likely to occur at any time whenever the character in question becomes affected by adaptation, so that a natural system will not result.

Theobald's comprehensive work stimulated many students to attack the subject, but for the most part they revolved in the same orbit, and the weeding out of the unreliable characters proceeded very slowly until Dyar and Knab approached the subject from a new standpoint, that of the larvæ.

The subject of the characters shown by the larvæ was independently taken up by Christophers, who discussed the larvæ of India. The species there seem to exhibit the same problems as the North American ones, all the principal types being represented, both vegetable-feeding and predaceous, except the sabethine forms, which seem not to have come under his observation. Christophers duly comments on the numerous unlike types which have been heretofore included under the name *Culex,* but does not separate them out under definite names. His new genus, founded for *Culex concolor* and *C. tigripes,* seems undoubtedly valid, for the larvæ are of a most peculiar type, unlike anything familiar to us, and the adults should be examined for generic characters.

At about the same time Felt, and also Dyar, used the modifications of the male genitalia as the basis of generic separation and definition. It is obvious that genera founded upon larvæ or male genitalia violate none of the principles laid down above, and the only objection to be urged against them is one of convenience. Not all the specimens received for determination are bred, nor are both sexes always represented. Moreover, the proper association of male and female is not always certain, while the proper examination of the structure of the male genitalia requires the practical destruction of the specimen and considerable time. It seems therefore advisable to restrict the characters used in generic definition to those found in both sexes of the adult.

Stimulated by this work, Coquillett produced a classification in which the objectionable characters were almost entirely eliminated as far as the subfamilies were concerned. They would have been completely so except for the attempt to recognize the subfamilies proposed by Mitchell. In the genera he failed to introduce new and valid characters, for the reason that it was im-

Digitized by Google

possible to do so and retain the genera proposed by Theobald. Nevertheless, this classification is a distinct advance upon anything at that time proposed, although in it, in common with most others, all the groups are disproportionately magnified. The "subfamilies" are of no greater value than subtribes. In this view we concur with Lahille and Williston, who have criticized this tendency to exaggeration. Following Coquillett's work, Dyar and Knab produced a paper in which an attempt was made to separate not only the higher groups, but also the genera, on unobjectionable structural characters, and their arrangement was adopted by Williston. We here adopt the same scheme, with sundry minor corrections.

In conclusion attention must be called to the very excellent revisional work on Old World Culicidæ accomplished in the last few years by F. W. Edwards of the British Museum. A great deal of unsuspected synonymy has been established and the species grouped in natural genera, due cognizance being taken of genitalic and larval characters. While Mr. Edwards draws his genera somewhat more closely, he having been unwilling to discard altogether the secondary sexual characters, his results in the main harmonize very well with those herein set forth.

BIBLIOGRAPHY FOR THE HISTORY OF CLASSIFICATION

LINNAEUS, CAROLUS. Systema Naturæ. Regnum animale, ed. 10 (*Culex*, p. 602–603), 1758. (Reprint: Proc. Ent. Soc. Wash., xi, 30, 1909.)

MEIGEN, J. W. Systematische Beschreibung der bekannten Europäischen zweiflügeligen Insekten, part I. (*Culex, Anopheles, Aëdes*, pp. 1–10.) 1818.

ROBINEAU-DESVOIDY, J. B. Essai sur la tribu des culicides. Mémoires de la Société d'histoire naturelle de Paris, III, 390–413, 1827.

LYNCH ARRIBÁLZAGA, FÉLIX. Dipterologia Argentina. Culicidae. Revista del Museo de La Plata, I, 347–377; II, 133–174, pls. 1–5. 1891.

WILLISTON, S. W. On the Diptera of St. Vincent. Trans. Entom. Soc. London for 1896, 253–446 (Culicidæ, p. 270–272, pl. viii, figs. 28, 29, 30; pl. ix, fig. 31). 1896.

GILES, G. M. A handbook of the gnats or mosquitoes. xii + 374 pp. London, 1900.

BLANCHARD, R. Instructions à l'usage des médecins, des naturalistes et des voyageurs, rédigées au nom de la commission du paludisme. Bull. de l'Acad. de Médecine, (3), XLIV, 3 juillet, 1900. (p. 31, Corethridae.)

GRASSI, BATTISTA. Studi di uno zoologo sulla malaria, 2 ed. (Anophelinæ, Culicinæ, pp. 95–112). Roma, 1901.

THEOBALD, F. V. The classification of mosquitoes. Journ. Trop. Med., iv, 229–235, 1901.

———. A monograph of the Culicidæ or mosquitoes, I, xviii + 424 pp.; II, viii + 391 pp. 1901.

BLANCHARD, RAPHAËL. Observations sur quelques Moustiques. Comptes Rendus hebdom. Soc. Biol., Paris, LIII, 1045–1046. 1901.

NEVEU-LEMAIRE. Sur la classification des Culicides. C. R. Soc. Biol. Paris, LIV, 1329–1332. 1902.

———. Classification de la famille des Culicidæ. Mém. Soc. Zool. France, xv, 195–227, 12 figs. 1902.

GILES, G. M. A handbook of the gnats or mosquitoes. 2 ed., xii + 530 pp., figs., pls. 1902.

THEOBALD, F. V. The classification of the Anophelina. Jour. Trop. Med., v, 181–183, 1902.

BLANCHARD, R. Sur le démembrement des *Anophelinæ*. C. R. hebd. Soc. Biol., Paris, LIV, 794–795. 1902.

THEOBALD, F. V. A monograph of the Culicidæ or mosquitoes, III, xviii + 359 pp. 1903.

LAHILLE, F. Notes sur la classification des moustiques. (*Extrait de* Actas y Trabajos del Segundo Congreso Médico Latino-Americano, *tomo* II) 23 pp., 4 figs., 1 chart. Buenos Ayres, 1904.

Digitized by Google

LUTZ, A., in: Bourroul, Celestino. Mosquitos do Brasil. Thesis, 78 pp. Bahia, 1904.

FELT, E. P. Mosquitoes or Culicidæ of New York State. N. Y. State Museum Bull. 79, 241–400, pls. 1–57. 1904.

———. Generic revision of Culicidæ. N. Y. State Mus. Bull. 79, appendix, 391*a*–391*f*. 1904.

GILES, G. M. A revision of the Anophelinæ. 47 pp., figs. London, 1904.

DYAR, HARRISON G. Our present knowledge of North American corethrid larvæ. Proc. Ent. Soc. Wash., VII, 13–16, figs. 1905.

———. Remarks on genitalic genera in the Culicidæ. Proc. Ent. Soc. Wash., VII, 42–49, 1 fig. 1905.

EYSELL, ADOLF. Sind die "Culiciden" eine Familie? Archiv f. Schiffs- u. Tropen-Hyg., IX, 49-55, 1905; Abh. Ber. Ver. Nat. Kassel, XLIX, 16–24. 1905.

———. Nachtrag zu "Sind die Culiciden eine Familie?" Arch. Schiffs- u. Tropen-Hyg., IX, 275. 1905.

BLANCHARD, RAPHAËL. Les Moustiques. XIV + 673 pp., figs., Paris, 1905.

FELT, E. P. Studies in Culicidæ. N. Y. State Mus. Bull. 97, 442–497, pls. 1–19. 1905.

THEOBALD, FRED. V. Culicidæ. Genera Insectorum, Fasc. 26; 50 pp., 2 pls. 1905.

DYAR, HARRISON G., and FREDERICK KNAB. The larvæ of Culicidæ classified as independent organisms. Journ. N. Y. Ent. Soc., XIV, 169–230, pls. iv–xvi. 1906.

CHRISTOPHERS, S. R. On the importance of larval characters in the classification of mosquitoes. Scient. Mem. by Officers of the Medical and Sanitary Departments of the Government of India, new series, no. 25, 18 pp., 3 pls. 1906.

MITCHELL, EVELYN G. Mouth parts of mosquito larvæ as indicative of habits. Psyche, XIII, 11–21, figs. 1906.

COQUILLETT, D. W. On breaking-up of the old genus Culex. Science, n. s., XXIII, 312–314. 1906.

———. A classification of the mosquitoes of North and Middle America. U. S. Dept. Agric., Bur. Ent., Techn. Ser. no. 11, 31 pp., 1 fig. 1906.

THEOBALD, FRED. V. A monograph of the Culicidæ or mosquitoes, IV, XX + 639 pp., figs., pls. 1907.

DYAR, HARRISON G., and FREDERICK KNAB. On the classification of the mosquitoes. Canad. Ent., XXXIX, 47–50. 1907.

WILLISTON, SAMUEL W. Manual of North American Diptera, 3 ed., 405 pp., figs. (Culicidæ, 96–109). 1908.

PERYASSÚ, ANTONIO GONÇALVES. Os Culicideos do Brazil. Trabalho do Instituto de Manguinhos. 409 pp., figs., pls. Rio de Janeiro, 1908.

THEOBALD, FRED. V. A monograph of the Culicidæ or mosquitoes, V, XIV + 646 pp., figs., pls. 1910.

EDWARDS, F. W. The African species of Culex and allied genera. Bull. Ent. Research, II, 241–268. 1911.

———. A synopsis of the species of African Culicidæ, other than Anopheles. Bull. Ent. Res., III, 1–53. 1912.

———. Revised keys to the known larvæ of African Culicinæ. Bull. Ent. Res., III, 373–385. 1912.

Digitized by Google

ACCOUNT OF THE GENERA AND SPECIES OF THE MOSQUITOES OF NORTH AND MIDDLE AMERICA AND THE WEST INDIES.

Tribe SABETHINI.

The proboscis is well developed, sometimes with a central transverse suture in the male. Eyes large, sometimes excessively so, becoming contiguous on the vertex and produced forward to touch the clypeus. Palpi always small in the female, the joints more or less reduced in number; usually also short in the male, though in some forms about as long as the proboscis. Antennæ with the joints of the shaft subequal in the female, all but the last two sometimes shortened in the male, although not to an extreme extent, and frequently very similar to the antennæ of the female. Vertex with a pair of very large and coarse bristles inserted near ocular angles and projecting forward and downward. Vestiture of scales well-developed, the occiput smoothly scaled, the erect forked scales either absent or condensed into a collar-like row on the posterior margin of the occiput. Mesonotum without setæ on the disk, the setæ present only along the margin or over the roots of the wings. Postnotum with a group of small setæ on its posterior portion. Abdomen subcylindrical or compressed, the tip bluntly rounded, the terminal setæ usually abundant. Wings moderate, the veins well-scaled, but without any diversity or pattern of markings. Legs usually long, sometimes distinctly long, in some instances decorated with outstanding scales in the form of fringes or "paddles"; claws generally simple in both sexes, always so in the female, sometimes with teeth or serrations in the male. Coloration generally more or less metallic, often brilliantly blue. The imagos hold their legs in a peculiar and very characteristic manner, both when at rest and during flight. The hind legs are raised above the body and bent forward so that the ends of the tarsi approach the head.

The larvæ are at once distinguishable from those of all other Culicidæ by the absence of the median ventral brush of the last abdominal segment. This brush is represented by a pair of hairs or hair-tufts, placed laterally below the dorsal plate of this segment. The larvæ present a characteristic appearance, both in form and coloration. The latter is always pale yellow throughout, relieved only by a dark margin of the foramen of the head and sometimes a dark margin of the dorsal plate and base of breathing tube. The head is broad and flattened, rounded in front and widest posteriorly. The antennal shaft is small, slender, and smooth. The mouth-brushes are dense but never as long and abundant as in most culicines. The small accessory eye-spots alone are visible until shortly before pupation. The thorax is broad, quadrate. The lateral hairs of the body

Digitized by Google

are long, the dorsal and ventral ones often developed into several series of stellate tufts. The breathing-tube is always present and presents considerable diversity in shape and vestiture. The pecten is either absent or inconspicuous. The apical orifice of the tube is small and the closing mechanism is not so highly developed as in the culicines.

The pupæ differ from those of all other Culicidæ by the presence of ample hair-tufts at the apical angles of the seventh and eighth abdominal segments. The paddles are comparatively small and of irregular outline, never broad and rounded, as in the culicines. The color of the pupa is usually pale yellow, like the larvæ, although in some forms the dorsum is dark or marked with a dark pattern.

This tribe presents on the whole more specialization than the Culicini, and we therefore place it first. It presents, it is true, many generalized characters, and if one were to dwell upon these the decision might easily be reached to place the group last. It is, however, compact, its members agree in structure and in life-habits; they are separated by a considerable discontinuous interval from the Corethrinæ, from which the Culicini more naturally lead up. We therefore begin with this group, not desiring to interpolate it between the Culicini and Corethrinæ, the only other possible position.

The Sabethini are essentially of tropical distribution, only one species, *Wyeomyia smithii* Coquillett, extending the range of the tribe into temperate latitudes. The larvæ inhabit the water collected in plants, usually between leaves or the bracts of flowers, more rarely that in the hollows of trees; in some cases the amount of fluid is very scant and of a thick or gummy nature, apparently secreted by the plant. The eggs are generally laid upon the young or still dry leaves, and do not hatch until the advent of water. The detailed habits, so far as known, will be described under the separate species. Certain of the larvæ are predaceous, generally upon members of their own tribe.

Members of this tribe were first recognized by F. V. Theobald, who in 1901 defined the first genera in which the presence of setæ on the postnotum was used as a diagnostic character. He did not segregate them into a separate group, as he dwelt more particularly on the differences in length of the palpi and other less important or sexual characters; however, in his original table of genera (Mon. Culicid., i, pp. 97–98, 1901) his section A corresponds to the Culicini as here treated, his sections B and C together to the Sabethini, and his section D to the Corethrinæ. This classification approached the one at present adopted by us. Mr. Theobald, however, never elaborated it upon this basis, but departed from it, and in his fourth volume adopts a distinctly inferior system, in which the character of the setæ upon the postnotum is obscured, and the mosquitoes are divided into no less than 10 "subfamilies," based upon characters of no more than generic value. Adolpho Lutz was the first to unite the forms of this group (under the name Metanototrichæ), but in too subordinated a manner. He again subdivided them into two groups on the length of the male palpi, Heteropalpæ and Micropalpæ. Theobald had already, in 1901, established a subfamily (Trichoprosoponina) for the forms in which scales are present on the post-

Digitized by Google

notum in addition to the setæ. The character does not even hold for genera. Dyar and Knab, in their paper on the classification of mosquitoes upon larval characters, readily recognized the proper division, which is well marked in the larvæ, but made the mistake of retaining the anophelines in a separate "subfamily," giving a too great value to the sessile air-tube of these forms, which is simply a character of generalization and does not indicate taxonomic disconnection.

The discovery of new forms brought to light an apparent sabethine among the relatives of *Deinocerites,* a culicine genus. At least this new form possessed setæ upon the postnotum and was christened *Dinomimetes,* in allusion to the "wonderful mimicry" of *Deinocerites,* of which a sabethine was capable. Further study of this form showed that it was in fact a near relative of *Deinocerites,* having practically identical male genitalia and larvæ, and while the name is still excellently descriptive, we have to do with a *Deinocerites* that "wonderfully mimics" the structure of a sabethine, instead of the reverse. This discovery, and the recently made one that small bristles sometimes occur on the postnotum of the culicine *Hæmagogus,* vitiates the distinction hitherto drawn between the Culicini and Sabethini, and we have found ourselves obliged to search for supplementary characters. We believe we have found these in the presence of the two coarse bristles on the vertex and the short hind femora, together with the absence of setæ from the disk mesonotum as described above.

Characters of generalization retained by the Sabethini are the weak development of setæ, the absence of armature on the claws of the feet and the presence of setæ upon the postnotum. In the larvæ the mouth-parts are primitive and largely remain functional, not being replaced in use by the oral cilia as much as in the culicines, the raptorial forms using the maxillæ as organs of prehension; the mechanism of 5 flaps for closing the air-tube seen in most Culicini is here undeveloped.

Characters of specialization are the marked reduction of the palpi and the decrease in the number of the joints, generally affecting both sexes, and the broadening of the wing-scales and the loss of pattern and diversified coloration. The larvæ all possess long, well-developed air-tubes, as well as many of the pupæ, even producing such a peculiar monstrosity as the pupa of *Wyeomyia circumcincta.* The male genitalia are for the most part peculiarly modified, but in the simplest forms resemble those of the megarhinines or of the lowest culicines, and are not so generalized as those of the anophelines.

The origin of the Sabethini would seem to be at a point in the genealogical tree in the vicinity of *Megarhinus* and *Orthopodomyia,* above *Uranotænia* and *Aëdeomyia.* No form from which they could be directly derived seems to be now existant. Exclusive of the anophelines, which represent an evolutionary stage too primitive for our present consideration, the ancestral larva would appear to have been an inhabitant of water in hollow trees or the leaves of plants, combining the characters of *Orthopodomyia* and *Megarhinus.* It was no doubt a vegetable feeder, consuming considerable solid matter in the larval state. The adult was probably brilliantly colored, with the smooth vestiture of

Digitized by Google

Megarhinus and the simple male genitalia of *Megarhinus* and *Orthopodomyia*. If this view is correct, the absence of the ventral brush in the larvæ of the Sabethini is to be explained as the loss of a character originally present in the ancestors of the group. This structure functions as a steering organ or rudder during the progression of the larva through the water, and is present in all the other Culicidæ. In the Culicini the brush is not present in the first larval stage, appearing only at the first ecdysis, so that if the structure were disadvantageous to the Sabethini it may have become entirely suppressed. That it may have been disadvantageous seems reasonable to suppose from the following consideration: We will suppose the structure originally present in a larva inhabiting holes in trees where the water, although sometimes scanty, generally has a considerable depth. The structure would then still be useful. However, as the sabethids developed, they became more and more adapted to inhabit the water between the leaves or flowers of plants, which is generally contained in very small or narrow receptacles. In such situations the ventral brush would be in the way, and its elimination would be an advantage.

Again, if this derivation be correct, we must consider the presence of setæ upon the postnotum as an acquired character and not one of generalization, representing an originally hairy and functional condition of this structure; for there are no setæ upon the postnotum of the anophelines, nor of any of the other Culicini, except in the specialized *Dinomimetes* and *Hæmagogus*, which are not related to the Sabethini. We are unaware of the functional importance of this structure, if indeed it has any, and are unable to suggest why it should have arisen. Its sporadic appearance in wholly unrelated genera of Culicini reduces its importance. We observe that setæ appear likewise in an apparently sporadic manner upon the postnotum of some Tipulidæ, so that perhaps this character is of no fundamental value in the Diptera. However, in the case of the Sabethini, the setæ of the postnotum are correlated with a number of well-marked characters, and, while this character seems insignificant, it nevertheless indicates a natural and distinct group.

Tables of Genera of the Tribe Sabethini[1]

ADULTS.

1. Eyes separated by at least a narrow area; prothoracic lobes collar-like..... 2
   Eyes broadly contiguous above; prothoracic lobes sublateral..... 6
2. Prothoracic lobes contiguous or closely approximated dorsally..... 3
   Prothoracic lobes well separated..... 5
3. Front femora shorter than the middle ones...*Sabethes* Robineau-Desvoidy (p. 23)
   Front femora as long as the middle ones..... 4
4. Proboscis moderate, swollen at tip..... *Sabethinus* Lutz (p. 31)
   Proboscis long and slender..... *Sabethoides* Theobald (p. 37)
5. Hind tarsi with 2 claws, normal..... *Wyeomyia* Theobald (p. 49)
   Hind tarsi with but 1 claw..... *Limatus* Theobald (p. 40)
6. Proboscis long and slender throughout..... 7
   Proboscis short, swollen at tip; clypeus scaled..... *Prosopolepis* Lutz (p. 160)
7. Clypeus with setæ..... *Joblotia* Blanchard (p. 175)
   Clypeus nude..... *Lesticocampa* Dyar & Knab (p. 162)

[1] See page 185 for remarks on unrecognized genera.

Digitized by Google

MALE GENITALIA.

1. Clasp-filament simple ..... { *Joblotia* Blanchard (p. 175) / *Lesticocampa* Dyar & Knab (p. 162)
   Clasp-filament modified and divided..... { *Wyeomyia* Theobald (p. 49) / *Limatus* Theobald (p. 40) / *Sabethinus* Lutz (p. 31) / *Sabethes* Robineau-Desvoidy (p. 23)

The following genera are not included, as we possess no males: *Sabethoides* Theobald, *Prosopolepis* Lutz.

LARVÆ.

1. Lateral comb present on eighth segment..... 2
   No lateral comb on eighth segment..... *Joblotia* Blanchard (p. 175)
2. Air-tube spicular; maxillæ heavily armed..... 3
   Air-tube smooth; maxillæ without heavy armature. { *Wyeomyia* Theobald (p. 49) / *Limatus* Theobald (p. 40)
3. Head normal, the mouth-parts not visible from above... *Sabethinus* Lutz (p. 31)
   Head with the mandibles and maxillæ greatly developed *Lesticocampa* Dyar & Knab (p. 162)

The following genera are not included, the larvæ being unknown: *Sabethes* Robineau-Desvoidy, *Sabethoides* Theobald, and *Prosopolepis* Lutz.

Genus SABETHES Robineau-Desvoidy.

Sabethes Robineau-Desvoidy, Mém. Soc. d'hist. nat. Paris, iii, 411, 1827.
Sabettus Scudder, Bull. 19, U. S. Nat. Mus., i, 297, 1882.
Sabethes Lynch Arribálzaga, Rev. del Mus. de La Plata, i, 373, 1891.
Sabethes Giles (in part), Gnats or Mosq., 183, 1900.
Sabethes Theobald, Journ. Trop. Med., iv, 235, 1901. (Without species.)
Sabethes Theobald (in part), Mon. Culic., i, 247, 1901.
Sabethes Theobald (in part), Mon. Culic., ii, 345, 1901.
Sabethes Giles, Gnats or Mosq., 2 ed., 475, 1902.
Sabethes Neveu-Lemaire, Compt. Rend. Soc. Biol. Paris, liv, 1331, 1902.
Sabethes Neveu-Lemaire, Mém. Soc. Zool. France, xv, 225, 1902.
Sabethes Theobald, Mon. Culic., iii, 321, 1903.
Sabethes Lutz in Bourroul, Mosq. do Brasil, 56, 1904.
Sabethes Lahille, Class. des moust., 18, 1904.
Sabettus Blanchard, Les Moustiques, 420, 1905.
Sabethes Theobald, Gen. Ins., Culic., 39, 1905.
Sabethes Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 28, 1906.
Sabethes Dyar & Knab (in part), Can. Ent., xxxix, 49, 1907.
Sabethes Theobald, Mon. Culicid., iv, 594, 1907.
Sabethes Peryassú, Os Culic. do Brazil, 38, 1908.
Sabethes Williston (in part), No. Amer. Dipt., 3 ed., 108, 1908.
Sabethes Pazos, San. y Ben., ii, 41, 1909.
Sabetes Pazos (in part), San. y Ben., ii, 44, 1909.
Sabethes Theobald, Mon. Culic., v, 574, 1910.

The type species are: of *Sabethes* Robineau-Desvoidy, type *Sabethes locuples* Robineau-Desvoidy; of *Sabettus* Scudder, type *Sabethes locuples* Robineau-Desvoidy.

GENERIC DIAGNOSIS OF ADULT:

Head moderate; proboscis rather short, swollen at apex; palpi short in both sexes; eyes large, contiguous at vertex; antennæ with the joints subequal, similar in the sexes, sparsely plumose, each joint with a whorl of long hairs near base and a small one near apex. Prothoracic lobes large, contiguous dorsally. Vestiture of flat appressed scales, without setæ on the disk of the mesonotum. Abdomen of female subcylindrical, blunt at tip, laterally compressed. Legs long and slender, the mid femora longer than the front or hind ones, with large projecting, flattened scale-tufts, most developed on the middle legs. Wings rather narrow, the cross-veins tending to lie in line, or the basal one beyond the anterior, but subject to variation. Claws of female small, equal, and simple. Male with claws on the middle legs subequal, one of them expanded and serrated at the broad apex. Male genitalia with the clasp filament greatly modified.

The life histories and the larvæ are entirely unknown.

Digitized by Google

Forested regions of tropical America.

The genus *Sabethes* was established on the peculiar scaling of the legs, and was discarded by subsequent authors as insufficiently founded. Arribálzaga apparently had no specimens before him, and makes the erroneous supposition that the males have long palpi. Theobald places the genus wrongly in his first volume, having not noted the setæ upon the postnotum, but corrects the matter in a footnote. He still uses the leg-tufts to define the genus. We are able to adduce more reliable characters for the genus, which is a good one.

The type of *Sabethes* is obviously *Sabethes loculpes*, as Desvoidy mentions this first, describes it as new, and it was the only species before him. He quotes Fabricius's description of *Culex longipes* as possibly belonging to the genus. Blanchard is, therefore, incorrect in citing *longipes* Fabricius as the type of *Sabethes*.

Nothing is known of the early stages and very little about the life history of the genus. The adults are diurnal, inhabiting forests. Concerning a Brazilian species, for which we propose the name *Sabethes goeldii*,* Prof. Dr. Goeldi says:

"The mosquitoes of the genus *Sabethes* are frequent in the forests, even in the municipal grove, in Utinga and in Murutucú. They follow persons from the time they enter the woods until they leave them again, but it is seldom that it happens that they actually bite. The specimen which served as the model for our colored figure entered during bright sunlight at midday on the 20th of October, 1903, from the garden, through the window into the residence of the director. It was captured in a large glass tube and died some hours afterwards; it gave ample time to appreciate its exquisite attitude of flight and fix it in a sketch, the absolute fidelity of which we guarantee. The front legs are elevated in the form of an S; the middle pair are lowered and raised in an abrupt curve over the abdomen until the tips almost touch the hind margin of the thorax; while the hind pair is kept raised. This flight has a very elegant appearance, the mosquito, as if it wished to be admired, remains stationary in the air, now here, now there, for some little time, simply vibrating its wings.

"That the females accept blood we verified with certainty with a number of individuals; 7 other specimens were fed with honey and water, refusing blood. These remained alive from 1 to 5 days without laying eggs. All attempts to obtain the eggs or larvæ were fruitless." (Os Mosquitos no Pará, 1905, p. 128.)

The large size of these mosquitoes, and their rareness, leads us to surmise that the larvæ are predaceous, perhaps inhabiting bromeliads. All the large Culicidæ, as far as known, have predaceous larvæ; the large size is without doubt due to the richer larval nourishment and also is necessary to enable the larvæ to cope

---

* *Sabethes goeldii*, new species.—Founded on Dr. Goeldi's figure (Os Mosquitos no Pará, 1905, pl. v, fig. 18) and a specimen from Trinidad (F. W. Urich). Type: Cat. No. 19640, U. S. Nat. Mus.

Female: Proboscis short, gradually swollen to the tip; palpi about one-third as long as proboscis. Occiput, mesonotum, and abdomen above metallic green and blue. Legs with paddle-shaped tufts on all three pairs, those on the middle legs the largest; fore legs with narrow paddles involving the tibia and first tarsal joint black, second to fourth tarsal joints white; middle legs with large paddles on the outer two-thirds of tibia and first tarsal joint, continued narrowly on second and third joints, black, second to fourth joints white-scaled, tibiæ white above the ciliation; hind legs very narrowly ciliate on outer half of tibiæ, rather broadly so on apical half of first tarsal joint, black, fourth and fifth joints white, extreme tip of latter black.

The following table will separate the known species of *Sabethes:*

1.	Middle legs only with tufts	2
	Front legs also with small tufts, none on hind legs	*tarsopus* Dyar & Knab
	Front and hind legs also with small tufts	5
2.	Tuft on mid tibia only, not on tarsus	*purpureus* Peryassú
	Tuft on mid tibia and tarsus	3
3.	No white on the legs	4
	Apical part of fringe on middle legs white	*bipartipes* Dyar & Knab
4.	Basal cross-vein beyond the anterior cross-vein	*cyaneus* Fabricius
	Cross-veins coincident, or the anterior within	*albiprivus* Theobald
5.	Tarsi marked with white	6
	Legs without white markings	*lutzii* Theobald
6.	Fore tarsi white on second to fourth joints	*goeldii* Howard, Dyar & Knab
	Fore tarsi black, with a white line on apical half of second joint	*schausi* Dyar & Knab

Digitized by Google

successfully with their prey. The rarity of predaceous forms is conditioned by their limited food-supply.

TABLES OF THE SPECIES OF THE GENUS SABETHES.

ADULTS, STRUCTURE AND COLORATION.

1. Middle legs only with tufts..... 2
   Front legs also with small fringes; none on hind legs
   tarsopus Dyar & Knab (p. 25)
2. No white on the legs..... *cyaneus* Fabricius (p. 26)
   Apical part of fringe of middle legs white..... *bipartipes* Dyar & Knab (p. 30)

ADULTS, MALE GENITALIA.

1. Clasp-filament greatly modified and distorted..... *cyaneus* Fabricius (p. 28)

The species *tarsopus* Dyar & Knab and *bipartipes* Dyar & Knab are not included, as we possess no males.

No larvæ are known in this genus.

SABETHES TARSOPUS Dyar & Knab.

Sabethes longipes Coquillett (not Fabricius), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 28, 1906.
Sabethes longipes Busck (not Fabricius), Smiths. Misc. Colls., quart. iss., lii, 71, 1908.
Sabethes tarsopus Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 62, 1908.

ORIGINAL DESCRIPTION OF SABETHES TARSOPUS:

Female.—Proboscis moderately long, slender, swollen at the apex, clothed with black scales, with a metallic blue luster; palpi black-scaled, with blue luster; prothoracic lobes brilliantly blue-scaled; mesonotum similar, becoming paler in color with a greenish silvery tinge on the scutellum; pleura and coxæ silver-scaled; metanotum with a group of bristles near the apex, its surface clothed with flat silver scales; postscutellum brilliantly light blue-scaled; abdomen with metallic blue scales above and at the sides, beneath silvery white-scaled, the colors separated in a straight line; tip of the abdomen with coarse black bristles; legs mostly metallic blue-scaled, with purple luster; the front and mid legs ciliate, hind pair simple; the front legs are ciliate on the apical half of the tibiæ and the base of the first tarsal joint, the ciliation following the upper and lower surfaces; the apical portion of the second and all of the following joints silvery white marked beneath; mid-legs with the ciliation on the apical half of the tibiæ and the first and second tarsal joints, very long along the dorsal margin of the tibia and first tarsal joint; second tarsal joint, including its ciliation, silvery white; third tarsal joint and most of the fourth silver-white, the apex of the fourth above and all of the fifth black-scaled; there is an elongate white spot on the ventral surface of the tibia just above the ciliation; hind legs without ciliation and with the fourth and fifth tarsal joints silver white on the inner side. Length 4.5 mm.

Three specimens, Bocas del Toro, Panama, September 28, 1903 (P. Osterhout); Paraiso, Canal Zone, Panama, November 1, 1907 (A. H. Jennings); Córdoba, Mexico, March 16, 1908 (F. Knab).

Type.—Cat. No. 11972, U. S. N. M.

DESCRIPTION OF FEMALE OF SABETHES TARSOPUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather short, slightly enlarged at tip, labellæ conically tapered; vestiture black with a blue reflection; setæ fine, short, obliquely outstanding. Palpi moderate, about one-fourth as long as proboscis, uniform, black with a blue reflection. Clypeus elongate, narrow, truncate at tip, convex, strongly white pruinose. Antennæ moderate, the joints subequal, rugose, pilose, black, second joint pale at base; tori subspherical with a cup-shaped apical excavation, black with a distinct white pruinosity; hairs of whorls rather long, sparse, black. Eyes very large, contiguous on vertex, partly inclosing the antennæ and touching the clypeus, brown. Occiput clothed with flat black scales with a metallic blue and green reflection, a row of setæ along margin of eyes; cheeks silver-scaled.

Prothoracic lobes large, approximate dorsally, similarly colored to the mesonotum, but brighter. Mesonotum blackish brown, clothed with elliptical, flat,

Digitized by Google

blue and green scales, a patch of more brilliant ones over root of wing, accompanied by some bristles. Scutellum trilobate, with broad, flat, brilliant blue and green scales, each lobe with a tuft of bristles. Postnotum elliptical, black, clothed dorsally with flat, appressed silvery-white scales, except posteriorly, where there is a small tuft of bristles. Pleuræ and coxæ brownish black, entirely clothed with flat, elliptical, silvery-white scales.

Abdomen subcylindrical, truncate at tip, the dorsal vestiture deep metallic blue; first abdominal segment with metallic greenish-blue scales, silvery ones at sides, with some pale hairs; venter silvery white, the colors separated in a nearly straight line on the sides, the scales roughened and suberect along mid-ventral line; last two segments dark-blue scaled medially; tip with many black bristles.

Wings narrow, smoky infuscated; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; cross-veins incident. Scales of veins broadly ovate or roundly triangular, brownish, metallic blue on the costa, densely overlapping, densest on the forks of second vein. Halteres blackish, except at base.

Legs long and slender, scales on outer half of tibiæ and the first two tarsal joints of the mid legs long and strongly outstanding on two sides, forming paddles; slight paddles present on fore legs. Vestiture blue-black, femora and tibiæ with violet reflection, trochanters white; a patch of white scales on apex of hind femur; an elongate patch of white scales on mid tibiæ between paddle and base; tarsi of middle legs with most of the scales on the second, all of the third and most of the fourth joints white; fourth joint with an elongate black apical mark above; fourth and fifth joints of hind tarsi white-scaled beneath. On the fore legs the paddles occupy the outer three-fourths of the tibæ; the third and fourth tarsal joints white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

In the specimen from Córdoba the white on the tarsi is more extensive, particularly on the front legs; here the white begins on the second joint, broadens on the third so that only a narrow dark dorsal line remains, and completely encircles the base of the fourth joint.

The adults are rare and solitary, diurnal, and will bite man; they frequent forests. Mr. Knab captured an adult at Córdoba, Mexico, flying out of a tree on which many bromeliaceous plants were growing, about 50 feet from the ground. He climbed the tree and carefully lowered the plants in the hope of finding the larvæ, but failed to discover them, although the bromelias contained numerous other insects and even frogs and their larvæ.

Southern Mexico and Central America.

Córdoba, Mexico, adult captured March 16, 1908 (F. Knab); La Corina, Costa Rica, February 4, 1909 (W. Schaus); Bocas del Toro, Panama, September 28, 1903 (P. Osterhout); Paraiso, Canal Zone, Panama, November 1, 1907 (A. H. Jennings).

SABETHES CYANEUS (Fabricius) Knab.

Culex cyaneus Fabricius, Syst. Antliat., 35, 1805.
Sabethes loculpes Robineau-Desvoidy, Mém. soc. hist. nat. Paris, iii, 412, 1827.
Culex cyaneus Robineau-Desvoidy, Mém. soc. hist. nat. Paris, iii, 405, 1827.
Culex cyaneus Wiedemann, Aussereurop. zweifl. Ins., i, 6, 1828.
Culex remipes Wiedemann, Aussereurop. zweifl. Ins., i, 573, 1828.
Culex remipes Macquart, Hist. Nat. Ins. Dipt., i, 37, 1834.
Culex longipes Macquart (not Fabricius), Mém. Soc. Roy. Sci. Lille, 1838, pt. 2, 38, 1838.
Culex longipes Macquart (not Fabricius), Dipt. exot., i, pt. 1, 34, 1838.
Culex longipes Macquart (not Fabricius), Dipt. exot., suppl. i, 8, 1846.
Culex remipes Schiner, Reise Novara, Dipt., 31, 1868.
Sabethes remipes Giles, Gnats or Mosq., 185, 1900.
Culex cyaneus Giles, Gnats or Mosq., 333, 1900.
Sabethes remipes Theobald, Mon. Culicid., i, 248, 1901.

Digitized by Google

Sabethes remipes Giles, Gnats or Mosq., 2 ed., 476, 1902.
Sabethes remipes Theobald, Mon. Culic., iii, 324, 1903.
Sabethes remipes Lutz in Bourroul, Mosq. do Brasil, 67, 1904.
Hæmagogus cyaneus Blanchard (in part), Les moust., 412, 1905.
Sabettus remipes Blanchard, Les moust., 422, 1905.
Sabethes remipes Goeldi, Os Mosq. no Pará, 128, 1905.
Sabethes remipes Felt, N. Y. State Mus. Bull. 97, 462, pl. 3, fig. 2, 1905.
Sabethes locuples Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 28, 1906.
Sabethes remipes Peryassú, Os Culic. do Brazil, 286, 1908.
Sabethes locuples Busck, Smiths. Misc. Colls., quart. iss., lii, 71, 1908.
Sabethes cyaneus Knab, Proc. Ent. Soc. Wash., xi, 154, 1909.
Sabethes remipes Theobald, Mon. Culic., v, 575, 1910.

ORIGINAL DESCRIPTIONS OF CULEX CYANEUS:

9. C. cyaneus abdominis lateribus linea alba..... *cyaneus*
Habitat in America meridionali Dom. Smidt. Mus. Dom. Lund.
Magnitudo et statura C. pipientis. Caput cyaneum, haustello nigro.
Thorax cyaneus. Abdomen planum, cyaneum: linea laterali alba.
Pedes elongati, nigri, tibiis cupreis.

ORIGINAL DESCRIPTION OF SABETHES LOCUPLES:

Metallicè cyaneo-violaceus. Abdomen, maculis lateralibus trigonis argenteis. Pedes graciles, tibiis tarsisque intermediis dilatatis, densè ciliatis.

Long. 4 lineas.

Antennæ, palpi, proboscisque nigra. Vertex ignitus. Thorax abdomenque metallicè cyaneo-violacea; abdomine, maculis lateralibus trigonis argenteis nitidis. Pedes graciles, bruneo-violacei. Tibiæ tarsique intermedii dilatata, densè ciliata, nitidè violacea. Alæ margine fuscanæ, nervis villosis.

Hanc speciem non molestam infestamque existimo.

Habitat in Brasilia. (Musæum Dejeanianum.)

ORIGINAL DESCRIPTION OF CULEX REMIPES:

Chalybeus; tibiis tarsisque mediis: illis apice, his basi late ciliatis. Stahlblau; Mittelschienen und Füsse, jene an der Spitze, diese an der Wurzel breit gewimpert. 2½ Linien ♂. Brasilien.

Fühler bräunlich; Rüssel und Kopf stahlblau: unten mit einigen Silberschüppchen. Mittel- und Hinterleib stahlblau, was zumal an letzterm ins Grünliche fällt. Brustseiten, wie es scheint, grüngolden; Bauch gelblich silberglänzend, so auch die Seitenränder der Hinterleibswurzel. Hüfte silberbeschuppt; Beine schön stahlblau. Mittelste Schienen bis über die Hälfte hinauf, und das ganze erste Glied der mittelsten Füsse lang und dicht gewimpert, so dass daraus ein grosses Ruder von eiförmigem Umrisse und senkrechter Fläche sich bildet (etwa so wie bei Lygaeus bilineatus, nur dass das Ruder hier eine Platte und nicht aus Wimpern gebildet ist); vorderste und hinterste Beine ohne alle Wimpern.—In Westermanns Sammlung.

DESCRIPTION OF MALE AND FEMALE OF SABETHES CYANEUS (LARVA UNKNOWN):

Female.—Proboscis rather short, slightly enlarged at tip, labellæ conically tapered; vestiture black with a blue reflection; setæ fine, short, obliquely outstanding. Palpi moderate, nearly one-third as long as proboscis, uniform, black with a blue reflection. Clypeus broadly triangular, rounded at tip, gray in middle, margins white pruinose. Antennæ moderate, the joints subequal, rugose, pilose, black, second joint pale at base; tori subspherical, with a cup-shaped apical excavation, blackish with a distinct white pruinosity around rim; hairs long, rather numerous, black. Eyes very large, contiguous on vertex, partly inclosing the antennæ and touching the clypeus, black. Occiput clothed with flat metallic-blue and violet scales, two setæ at vertex; margin of eyes silvery at sides.

Prothoracic lobes large, approximate dorsally, similarly colored to mesonotum; a row of setæ on anterior margin. Mesonotum blackish brown, clothed with broadly elliptical, flat, metallic-blue scales with a faint green reflection. Scutellum trilobate, with similar vestiture to the mesonotum, but more brilliant; each lobe with a tuft of bristles. Postnotum elliptical, brown, with a central flattened carina, four long bristles behind; no scales. Pleuræ and coxæ brownish black, entirely clothed with flat, elliptical, silvery-white scales.

Digitized by Google

Abdomen subcylindrical, truncate at tip, dorsal vestiture metallic blue. Venter silvery white, the color separated in a nearly straight but not sharp line; scales suberect along medioventral line; tip with numerous black bristles.

Wings narrow, faintly smoky infuscated; petiole of second marginal cell half as long as its cell, that of second posterior cell about equal to its cell; basal cross-vein half its length beyond posterior cross-vein; scales of veins moderate, broadly ovate or roundly triangular, black with metallic-green reflection, dense and broader on forks of second vein. Halteres blackish.

Legs long and slender; scales on outer three-fourths of tibiæ and first two tarsal joints of the mid legs long and strongly outstanding on two sides, forming paddles; no paddles present on fore and hind legs, although the scales are somewhat roughened on tibiæ and base of first tarsal joint; vestiture metallic violet and blue, trochanters silvery white; femora with a bronzy metallic reflection beneath on the basal portion. Ciliation of paddles black with strong iridescence in some lights. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Proboscis as in the female, with a brassy line on under side, nearly to tip; palpi short, slender, about one-sixth as long as proboscis; antennæ more plumose than those of the female, the last two joints long and slender, the rest progressively shorter toward the base, but all elongated; each joint with a large basal whorl of hairs and a small subapical one. Coloration as in the female. Abdomen subcylindrical, slender, metallic blue above, with patches of yellowish silvery scales at apical lateral angles of segments, venter yellowish silvery, the scales raised along the median line; seventh segment much expanded, metallic-blue scaled above and beneath with yellowish-silvery apical and lateral margins; tip with dense, coarse, black setæ. Wings narrower than in the female, the vestiture somewhat less abundant. One claw of mid tarsi simple, the other with a lateral thickening nearly reaching the apex, finely subdivided and forming a subapical serration; empodium small, spinose at tip.

Length: Body about 4.5 mm.; wing 4 mm.

Genitalia (plate 2, fig. 1): Side-pieces subconical, the tips conically tapered; basal lobe conical with stout thorn-shaped tip. Clasp-filament with a slender stem, curved at base, tip expanded and distorted, divided into several lobes, which are again subdivided, the central one expanded into a bladder, ribbed at its base. Harpes small, slender, curved, tips dentate. Unci small, inconspicuous. Basal appendages a row of spines on each side, borne on a common transverse chitinous base that arises from a rounded sublateral lobe. Sides of the penultimate segment roundedly expanded, densely setose.

The life history and habits of *Sabethes cyaneus* are unknown. The adults are rarely met with, and then only in single specimens.

Forest regions of South America to Panama.

Empire, Canal Zone, Panama, June 23, 1908 (A. H. Jennings); Empire, Canal Zone, Panama (H. Simms); Gatun, Canal Zone, Panama, August 24, September 8, October 30, 1909 (A. H. Jennings); Trinidad, British West Indies, November 4, 1905 (F. W. Urich); Paramaribo, Dutch Guiana (H. Polak); Pará, Brazil (C. F. Baker). The species is also reported from Manáos, Brazil (Lutz in Bourroul); Rio de Janeiro, Brazil (Peryassú); Amazon region, Hatatura and Otyba, Brazil; British Guiana (Theobald).

The name *remipes* has been in general use for this species, but that of *locuples* has clear priority. *Locuples* was wrongly referred as a synonym to *longipes* Fabricius, and so disappeared from the literature; but it has been shown that *locuples* and *remipes* refer to the same species. Lately Knab has shown that the

Digitized by Google

name *cyaneus* Fabricius is the earliest one applicable to this species. We quote his remarks, as follows:

"Theobald assumed that the *Culex cyaneus* of Fabricius is identical with Williston's *Haemagogus splendens*. . . . . To the writer the original description seemed to conflict with this identification in that it indicates a mosquito with uniformly white sides of the abdomen. This type of coloration is characteristic of the Sabethini and so are the long legs indicated by Fabricius. Very few mosquitoes of the metallic blue color of *Culex cyaneus* are known, and in view of the recent large collections of Culicidæ it seems improbable that Fabricius had before him a species that has remained unknown to subsequent workers. In considering these points Dr. Dyar and the writer thought that most probably the mosquito in question was identical with *Sabethoides nitidus* Theobald (=*S. confusus* Theo.) and published this opinion; however, until the type had been examined, this identification could not be more than tentative. The opportunity to definitely identify this mosquito came in 1908, when Mr. Busck visited Copenhagen, where the type is preserved in the Royal Zoological Museum.

"Mr. Busck examined the type at our request and what he found showed that our determination was incorrect. The specimen has a much swollen proboscis, while in *Sabethoides nitidus*, and also in *Hæmagogus*, the proboscis is slender. The abdomen is blue above, silvery below, not banded, and this indicated a sabethid; but Mr. Busck, who examined the specimen with a hand-lens, could find no setæ on the metanotum. Moreover, he found that on the front legs, the only ones remaining, the claws are toothed near the middle, a condition we had not found in any of the many sabethids we had studied. Yet we could not find that there was a blue culicine with swollen proboscis, and it seemed inconceivable that Fabricius had a mosquito which has since remained unknown. A review of all the blue mosquitoes with reference to the proboscis led inevitably to *Sabethes*, and as in the Fabrician type the middle legs, which in that genus bear the characteristic ciliation, were missing, it seemed probable that *cyaneus* belongs to *Sabethes*. Two points, however, the toothed claws and the absence of metanotal setæ, threw a doubt upon such identification. It seemed reasonable to suppose that Mr. Busck, in his examination with a hand-lens, had failed to find the delicate setæ on the metanotum; but that still left the toothed claws to be accounted for. In this extremity we applied to Dr. Böving, of the Copenhagen Museum, and he kindly reexamined the type. The points ascertained by Dr. Böving are as follows: (1) Metanotum undoubtedly with setæ; (2) antennæ plumose, the joints long, as in Sabethes; (3) palpi very short, hardly one-fifth the length of the proboscis—intact, without trace of breakage; (4) claws of the fore legs undoubtedly toothed, each claw with a small but distinct tooth near the middle; (5) wing with the posterior cross-vein nearer the apex of the wing than the anterior cross-vein; (6) wing with the scales of the veins broad, obliquely truncate. To these characters must be added the following, determined by Mr. Busck in his examination of the type: (7) Abdomen blue above, silvery below—no trace of banding; (8) proboscis much swollen apically; (9) wing with the second marginal cell very much longer than the second posterior cell. All these characters fitted *Sabethes locuples* Rob.-Desv., as known to us, perfectly, with the one exception of the toothed claws. As the Fabrician type is undoubtedly a sabethine, and we had only female specimens of *Sabethes* before us, it seemed practically certain that the Fabrician specimen is the male of *Sabethes locuples*. It is true that in the descriptions of male *Sabethes* available to us the front claws are stated to be simple. These descriptions, however, are by Theobald, an author who had, in our experience, proved to be unreliable in such details. While everything pointed to an error in Mr. Theobald's statement, the question could not be considered settled until a male *Sabethes* had been examined by someone else.

Digitized by Google

"The opportunity came with Dr. L. O. Howard's visit to Europe the past summer, and at our request he examined the material in the British Museum. Dr. Howard, with the use of the compound microscope, found that in the male of *Sabethes locuples* the claws of the front feet have a small tooth at about the middle. Thus the question is settled beyond a doubt: *Culex cyaneus* Fabricius is identical with *Sabethes locuples*, upon which Robineau-Desvoidy founded his genus, and with *Culex remipes* Wiedemann. Fabricius did not mention the most obvious character of the species, the ciliate middle legs, because, without a doubt, the specimen already had those legs missing when it came into his possession. Wiedemann had the type before him when he prepared his *Aussereuropäische zweiflügelige Insekten* and in such cases he gave supplementary notes, in addition or correction of the short Fabrician diagnosis; that he does not mention the ciliation of the middle legs is further proof that those legs were missing at that time.

"It may appear strange that Wiedemann failed to recognize the identity of *Culex cyaneus* Fabricius and his *Culex remipes*, described in the same volume. The description of *Culex remipes* was, however, added in the third supplement (Fernere Nachträge) of the first volume of the above named work, and it was drawn up at a later period when he no longer had the Fabrician type before him."

Robineau-Desvoidy, in quoting the original description of *Culex cyaneus*, already suggested its true position: "An Sabethes?"

Since the above was written a single male specimen has come into our hands through Mr. A. H. Jennings, who was fortunate enough to collect it, together with several females. The claws of the fore tarsi are simple. We have also received 3 males through the courtesy of Mr F. V. Theobald. These also have the tarsal claws simple, but they all show adhesions of a dried mucilaginous substance which in several instances closely simulates the appearance of teeth on the claws, even under the lower powers of a compound microscope. We think that this condition of the claws may be due to some condition of the life history, and that it probably commonly occurs upon specimens of this species. The claws of Fabricius's type are probably thus affected, giving rise to the errors of observation reported by our correspondents, as well as explaining Dr Howard's statements about the specimens in the British Museum.

SABETHES BIPARTIPES Dyar & Knab.

Sabethes bipartipes Dyar & Knab, Proc. Biol. Soc. Wash., xix, 136, 1906.
Sabethes nitidus Coquillett (not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 28, 1906.
Sabethes bipartipes Theobald, Mon. Culic., v, 622, 1910.

ORIGINAL DESCRIPTION OF SABETHES BIPARTIPES:

Proboscis black; palpi and head metallic blue; thorax olive-green with two broad, deep blue discal stripes, the prothoracic lobes blue; pleurae and coxae silvery; abdomen dark metallic blue above, greenish towards base, venter golden with silvery basal segmental bands; first segment entirely silvery underneath. Legs, the middle pair with the second and outer third of first tarsal joints with a long flattened fringe, black, the apical half of the fringe of the second segment creamy white, the leg deep metallic blue. Front and hind legs simple, blue.

Two specimens, Santo Domingo, West Indies (F. E. Campbell; A. Busck).

Type: Cat. No. 9980, U. S. Nat. Mus.

The same or a similar species has been described by Theobald as the male of his *Sabethes nitidus* (Mon. Culic., ii, 347, 1901); but the type of *nitidus* is clearly the female there described, and is referable to the section *Sabethoides*, in which the tarsi are not plumed, thus leaving the present species nameless.

DESCRIPTION OF FEMALE OF SABETHES BIPARTIPES (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, scarcely enlarged at tip, labellae conically tapered; vestiture black with a blue reflection; setae fine, short, obliquely outstanding. Palpi moderate, one-fourth as long as proboscis, uniform, black with

Digitized by Google

a blue reflection. Clypeus moderate, truncate at tip, convex, strongly white pruinose. Antennæ moderate, the joints subequal, rugose, pilose, black, second joint pale at base; tori subspherical, with a cup-shaped apical excavation, black with a distinct white pruinosity around the rim; hairs long, moderate, black. Eyes very large, contiguous on vertex, partly inclosing the antennæ and touching the clypeus, brown. Occiput clothed with flat black scales with a metallic green, violet, and blue reflection, two setæ at vertex; cheeks silvery white.

Prothoracic lobes large, approximate dorsally, similarly colored to mesonotum but more brilliant. Mesonotum blackish brown, clothed with elliptical flat scales with strong blue and green reflection, more brassy over roots of wings, where there is a group of stiff black hairs; a median dorsal stripe of dull coppery scales. Scutellum trilobate, with similar vestiture to the mesonotum, but brilliant brassy and silvery blue, each lobe with a tuft of bristles. Postnotum elliptical, pale brown, with a median rounded carina, a small tuft of bristles posteriorly; no scales. Pleuræ and coxæ brownish black, entirely clothed with flat elliptical silvery-white scales.

Abdomen slender, subcylindrical, truncate at tip; dorsal vestiture black with submetallic-green reflection; venter golden-scaled, the bases of segments silvery, the colors separated in a nearly straight line on the sides, the scales raised on the ventral line; tip with many black bristles.

Wings narrow, hyaline; petiole of second marginal cell half as long as its cell, that of second posterior cell as long as its cell; basal cross-veins slightly nearer the base than the anterior cross-vein. Scales of veins moderate, narrowly ovate, obliquely truncate, black, those on second vein larger and broader. Halteres pale, with blackish knob.

Legs long and slender, scales on outer third of tibiæ and the first and the basal half of the second tarsal joints of the mid legs long and strongly outstanding on two sides, forming paddles; no paddles present on fore and hind legs; vestiture violet blue; trochanters white; under sides of femora narrowly brassy at base; paddles of mid legs black on their basal two-thirds, outer third white; hind legs with apical third of tibiæ and base of first tarsal joint with erect scales, not forming paddles. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

We have no information upon the life history and habits of *Sabethes bipartipes*.

Island of Santo Domingo, West Indies.

Santo Domingo, August, 1905 (A. Busck); Santo Domingo (F. E. Campbell).

We have *Sabethes bipartipes* only from the island of Santo Domingo, but it may yet be found in other islands. Theobald described a broken specimen that seems close to this, if not the same, as the supposed male of his *Sabethes nitidus* (Mon. Culic., ii, 347, 1901) from Brazil. Although we find no differences from our species in Theobald's description, it seems very doubtful whether our form extends to Brazil. It is very unusual for the same species to occur in the West Indies and on the continent of South America, and we suspect that if we had specimens from the mainland differences would appear. In any case, the name we have applied is correct, as Theobald's *nitidus* is clearly founded upon the female specimens before him and not upon the supposed male, really a female of a species falling in another genus.

Genus SABETHINUS Lutz.

Sabethinus **Lutz in Bourroul, Mosq. do Brasil, 48, 57, 1904.**
Sabettinus **Blanchard, Les Moustiques, 634, 1905.**
Sabethoides **Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.**
Sabethoides **Dyar & Knab (not Theobald), Journ. N. Y. Ent. Soc., xiv, 225, 1906.**
Sabethes **Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xv, 208, 1907.**

Digitized by Google

Sabethes Dyar & Knab (in part), Can. Ent., xxxix, 49, 1907.
Sabethinus Theobald, Mon. Culic., iv, 618, 1907.
Sabethinus Peryassú, Os Culic. do Brazil, 38, 1908.
Sabethes Williston (in part), No. Am. Dipt., 3 ed., 108, 1908.
Sabetes Pazos (in part), San. y Ben., ii, 44, 1909.
Sabethinus Theobald, Mon. Culic., v, 574, 1910.

The type species are: of *Sabethinus* Lutz, *Sabethinus intermedius* Lutz; of *Sabettinus* Blanchard, *Sabethinus intermedius* Lutz.

GENERIC DIAGNOSIS OF ADULT:

Head moderate; proboscis rather short, swollen at the apex; palpi short in both sexes; eyes large, contiguous at the vertex; antennæ with the joints subequal, similar in the sexes, sparsely plumose, each joint with a whorl of long hairs near the base and a small one near the apex, more obvious in the male than in the female. Prothoracic lobes large, contiguous dorsally. Vestiture of flat appressed scales. Without setæ on the disk of the mesonotum. Abdomen subcylindrical, blunt at the tip, laterally compressed; in the male expanded apically. Legs long and slender, the mid femora proportionate, the hind ones shorter. Wings rather narrow, the cross-veins tending to lie in line. Claws small, equal and simple.

GENERIC DIAGNOSIS OF LARVA:

Head normal, mouth-parts concealed; maxillæ conical, drawn out into a long terminal claw, heavily armed on inner margin. Air-tube with spicular sculpture; lateral comb present on eighth abdominal segment; a pair of dorsal hooks on seventh segment.

Forested regions of tropical America.

We placed the genus *Sabethinus* at first as a synonym of *Sabethes,* but have finally concluded to recognize it upon the proportions of the femora. This consists in an elongation of the mid femora of *Sabethes,* while *Sabethinus* retains the normal proportions. The character is not very fundamental, as the elongation of the mid legs of *Sabethes* is connected with the display of the "paddles" with which they are furnished and is, therefore, of something of an adaptational character. The two groups, however, seem well separated on their general characters, while no one has been able to find the larvæ of *Sabethes* and those of *Sabethinus* are easily found. There must be some marked difference in habits, which will confirm us in the separation of the genera.

The larvæ occur in the water in bamboo-joints, often in considerable numbers. They are predaceous, devouring the larvæ of other mosquitoes. We are unable to say whether such constitute their only diet, but imagine that they must have other food and not be essentially cannibalistic, or they would not so frequently occur in considerable numbers in the same receptacle. The larvæ are said to hang perpendicularly from the air-tube when at rest. We are unacquainted with the function of the peculiar hooks on the dorsum of the seventh abdominal segment. The eggs are unknown. The adults are diurnal and are occasionally common in bamboo woods. They bite readily.

We have not seen the type species, *S. intermedius.* This is stated to have scales upon the postnotum, while they are absent in our species. However, we can give this difference no significance as the same differences occur within the genus *Sabethes.*

TABLES OF THE SPECIES OF SABETHINUS.

ADULTS, STRUCTURE AND COLORATION (FOR ALL THE KNOWN SPECIES).

1. Postnotum without scales..... 2
   Postnotum with scales..... 4
2. Abdomen with purple and coppery-red reflections..... *purpureus* Theobald
   Abdomen with blue or greenish luster..... 3
3. Anal setæ of the abdomen long, black; hind tarsi dark.....*identicus* Dyar & Knab
   Anal setæ shorter, brownish; fifth hind tarsal white below.....*undosus* Coquillett
4. Setæ at base of wings jet black..... 5
   Setæ at base of wing light golden-brown..... *aurescens* Lutz
5. Mesonotum metallic green..... *intermedius* Lutz
   Mesonotum deep metallic blue..... *albiprivatus* Lutz

Digitized by Google

The correct generic location of the above species is not guaranteed, as we have not seen them all. The species included in our own region separate as follows:

ADULTS, STRUCTURE AND COLORATION.

1. Anal setæ of the abdomen moderate, brownish; fifth joint of the hind tarsi white-marked beneath..... *undosus* Coquillett (p. 33)
   Anal setæ of the abdomen long, black; hind tarsi black.
   identicus Dyar & Knab (p. 35)

ADULTS, MALE GENITALIA.

The structures are essentially as in *Wyeomyia*, and our two species will be found included in the table of that genus, page 55.

LARVÆ.

1. Hooks on the seventh abdominal segment simple.... *undosus* Coquillett (p. 34)
   Hooks on the seventh abdominal segment toothed. *identicus* Dyar & Knab (p. 36)

SABETHINUS UNDOSUS (Coquillett).

Sabethoides undosus Coquillett, Proc. Ent. Soc. Wash., vii, 186, 1906.
Sabethoides undosus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 226, 1906.
Sabethoides undosus Dyar, Proc. Ent. Soc. Wash., viii, 20, 1906.
Sabethoides undosus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.
Sabethes undosus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 208, 1907.
Sabethes undosus Busck, Smiths. Misc. Colls., quart. iss., iii, 70, 1908.
Sabethoides undosus Theobald, Mon. Culic., v, 585, 1910.

ORIGINAL DESCRIPTION OF SABETHOIDES UNDOSUS:

Near *confusus*, but the dorsum of the abdomen is not white-scaled in the front angles of the segments. Scales of proboscis and palpi purple, those of the occiput violet-purple, a large patch of white ones on each side. Mesonotum and scutellum mixed metallic blue-, green-, and coppery-scaled, the humeri violet-scaled, the lower portion whitish, scales of pleura white. Abdomen purple-scaled, scales of venter white or yellowish, the upper border wavy. Legs purple-scaled, the lower side of the femora and inner side of the tibiæ brassy-yellow-scaled; tarsal claws simple. Wings hyaline, the scales brown. Length 3 mm.

Trinidad, W. I. Ten specimens collected by Messrs. F. W. Urich and A. Busck.
Type: No. 8292, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF SABETHINUS UNDOSUS:

Female.—Proboscis moderate, slightly enlarged apically, vestiture black with blue luster; labellæ small, rounded, with fine outstanding setæ. Palpi short, one-fifth as long as proboscis, slender, black, a tuft of outstanding hairs at base. Antennæ moderate, the joints subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, whitish pruinose; hairs of whorls long, moderately dense, black. Clypeus slender, elliptical, convex, dark brown with a white pruinosity, nude. Eyes large, contiguous at vertex, produced below nearly to clypeus, black. Occiput clothed with flat, shining, metallic green, violet, and blue scales, two brown setæ at vertex; cheeks silvery.

Prothoracic lobes large, approximate dorsally, clothed with violet and blue scales, bearing a dense row of coarse black bristles. Mesonotum blackish, clothed with broad, flat, metallic-green and olivaceous iridescent scales. Scutellum trilobate, densely covered with scales similar to those of the mesonotum, some with reddish luster, each lobe with a small tuft of brown bristles. Postnotum elliptical, prominent, dark brown, with a rounded median carina, a tuft of about ten large bristles posteriorly; without scales. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed, truncate at the tip, which bears a moderate tuft of brown hairs; dorsal vestiture black with slight blue reflection; venter silvery-white, the colors separated on the sides in a sharp, strongly undulating line; dorsum of first segment with submetallic blue-green vestiture and at the sides with a silvery patch.

Digitized by Google

Wings narrow, hyaline, iridescent; petiole of second marginal cell one-third as long as the cell, that of second posterior cell shorter than its cell; cross-veins nearly incident; scales of veins black, with a bronzy and blue reflection, elliptical, mostly obliquely subtruncate; those on forks of second vein denser. Halteres blackish, except at base.

Legs moderate, the vestiture black, with a blue and violaceous reflection, slightly roughened beneath at tips of hind tibiæ and base of first tarsal joint; last joint of hind tarsi white on inner side. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Entirely similar to the female, claws of fore feet slightly unequal, tip of abdomen expanded and truncate, scales at tip brilliantly iridescent; legs with a coppery luster beneath.

Genitalia (plate 2, fig. 4): Side-pieces over twice as long as wide, the tips conically tapered, a small, scarcely separated lobe at the base bearing two stout setæ and a number of fine hairs. Clasp-filament with a large, inflated, distorted branch, a slender inward branch at basal third long and recurved, a small branch at outer third curved, with a bent, divided tip, apex slightly inflated, bearing a series of spines at the tip, outer aspect pilose, a large inward inflated projection at outer third bearing a long marginal row of coarse teeth and a shorter finer submarginal row. Harpes flat, tapering outwardly, inner margin revolute, tip dentate. Harpagones and unci forming basal cones. Basal appendages represented by two groups of four spines each, remote from one another.

Larva, Stage IV (see figure of the entire larva, plate 42).—Head rounded (plate 131, fig. 463), side-angles obtusely rounded, a slight notch at insertion of antennæ, front margin broadly arcuate. Antennæ cylindrical, smooth, uniform, without hair; a long spine, two short ones and a long digit at tip. Eyes small, round. Mental plate square, nearly straight on front edge, a prominent central tooth and eight on each side, the last one largest; base wavily incised. Mandible quadrangular; an appendage before tip; an outer row of cilia from a collar; ten filaments on outer margin; dentition of four teeth on a process, the first much the largest; a spine before, a low double irregularity at base, a serrate filament and three feathered ones within; process below remote, taking the place of the basal angle, short, furcate, with long hairs at tip and a row of fine hairs between it and the dentition; a row of long hairs within; a basal row. Maxilla conical, the tip produced into a long, stout horn; divided by a suture; inner half with four large teeth and a small one on margin and two rows of cilia; a tuft of hairs at tip, arising from base of horn; two rudimentary filaments next the suture; a long spine from middle of outer half, its tip cleft. Palpi small, obliquely attached, with four minute digits. Thorax quadrangular, slightly rounded at the corners, wider than long, the mesothorax indicated; hairs long, the metathoracic ones with a posterior curved spine. Abdomen slender; hairs abundant, lateral tufts of first two segments multiple, single on third to sixth segments; short hairs in coarse, stellate bunches. Tracheal tubes moderate. A pair of simple dorsal hooks on seventh segment. Air-tube long, ten times as long as wide, strongly flared at base; surface densely spicular, with some hairs; no pecten. Lateral comb of eighth segment of eight simple spines; single spine thorn-shaped, the shaft smooth, the base fringed with short spinules. Anal segment as wide as long, dorsal plate reaching to middle of side; dorsal tuft of long hairs; a tuft of two long hairs at lateral angle of the plate; a subventral tuft of three long hairs; no ventral brush. Anal gills long, all four present three times as long as the segment, basal portion swollen, outer slender.

The larvæ occur in the water in bamboo-joints, often in considerable numbers. Mr. Busck states that they hang perpendicularly by the air-tube from the surface

Digitized by Google

of the water when at rest. He observed them to be predaceous in Trinidad. He says:

"Larvæ in bamboo stumps in bamboo woods; one of them (*S. undosus*) observed attacking and eating another (*Wyeomyia* sp.); larva is predaceous, feeds probably exclusively on the *Wyeomyia* larva; observed feeding several times."

He met with the species again in Panama, but did not repeat his observations on their predaceous habits. He says: "A common species bred in large numbers from bamboo at Tabernilla, Lion Hill, and Gatun." Now, in the case of predaceous species it generally happens that they occur singly or in small numbers, as they have to be relatively much less numerous than their prey in order to subsist. It would seem that a species which can be generally bred in "large numbers" can not be exclusively predaceous. Further observations should be made upon these habits.

The adults are diurnal, the females coming to bite in the woods in the day.

Trinidad, British Guiana, Panama, Nicaragua, and probably southward into Brazil.

Bluefields, Nicaragua (W. F. Thornton); Tabernilla, Canal Zone, Panama, larvæ in bamboo, May 9, 1907 (A. Busck); Lion Hill, Canal Zone, Panama, adults captured (A. Busck); Georgetown, British Guiana, adult captured, August 1, 1905 (E. D. Rowland); San Juan, Trinidad, larvæ in bamboo-stumps, June 7, 1905, associated with a species of *Wyeomyia* (A. Busck); Trinidad (F. W. Urich).

We have included specimens from Trinidad and Panama under this species, although the larvæ differ to some extent in the shape of the mouth-parts. We have not found any differences in the adults, though minute ones may possibly occur. Two races, or possibly species, are indicated, but we have not thought it advisable to attempt to separate them at present. The species of *Sabethinus* run very closely and should have particular study with good material from Brazil for comparison.

SABETHINUS IDENTICUS (Dyar & Knab).

Sabethes identicus **Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 207, 1907.**
Sabethes identicus **Busck, Smiths. Misc. Colls., quart. iss., iii, 71, 1908.**
Sabethoides **(?)** ***identicus*** **Theobald, Mon. Culic., v, 585, 1910.**
Sabethes **(?)** ***identicus*** **Theobald, Mon. Culic., v, 622, 1910.**

ORIGINAL DESCRIPTION OF SABETHES IDENTICUS:

♀.—Identical with *Sabethes undosus* Coq.; we are unable to demonstrate any differences whatever between the adults.

Four specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in bamboo joints.

Type: No. 10851, U. S. National Museum.

The larvæ are allied to those of *Sabethes undosus*, but differ in many particulars, so that a distinct species is indicated, in spite of the apparent identity of the adults. The air-tube is short, without any basal enlargement and but two pairs of single hairs; the body-hairs are finer, less coarsely stellate; the dorsal hooks of the seventh segment with a tooth instead of simple; maxillæ less stout, with seven small teeth instead of four large coarse ones.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF SABETHINUS IDENTICUS:

Female.—Proboscis rather stout, swollen at tip, vestiture black with violet luster; labellæ small, rounded, with fine outstanding setæ. Palpi short, one-fifth as long as proboscis, slender, black, a tuft of outstanding hairs at base. Antennæ moderate, the joints subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, whitish pruinose; hairs of whorls long, moderately dense, black. Clypeus slender, elliptical, convex, dark brown with a white pruinosity, nude. Eyes large, contiguous at vertex, black, produced later-

Digitized by Google

ally to the clypeus. Occiput clothed with flat, shining metallic green, violet, and blue scales, two brown setæ at vertex; cheeks silvery.

Prothoracic lobes large, approximate dorsally, clothed with pale metallic-blue scales, bearing a dense row of black bristles. Mesonotum blackish, clothed with flat metallic blue and green iridescent scales. Scutellum trilobate, densely covered with scales similar to those of the mesonotum, each lobe with a small tuft of brown bristles. Postnotum elliptical, prominent, dark brown, with a rounded median carina, a tuft of about ten large bristles posteriorly; without scales. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales; an irregular patch of dark-brown scales behind the prothoracic lobe.

Abdomen subcylindrical, compressed, truncate at tip, which bears a tuft of long black hairs; dorsal vestiture black, with metallic blue and violet reflection; first segment more brilliantly colored; venter yellowish silvery-white, the colors separated on the sides in a sharp, strongly undulating line.

Wings rather narrow, hyaline, iridescent; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; cross-veins nearly incident; scales of veins black, with bronzy and blue reflection, elliptical, mostly obliquely subtruncate, those on forks of second vein slightly larger and denser. Halteres blackish, except at the base.

Legs moderate, vestiture black with a blue and violaceous reflection, slightly roughened beneath at tips of hind tibiæ and base of first tarsal joint; femora and tibiæ and first tarsal joint of hind legs with a strong brassy luster beneath, the other tibiæ and tarsi with cupreous luster. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Entirely similar to the female, claws of fore feet slightly unequal, abdomen enlarged at tip and truncate, tuft of black hairs divided.

Genitalia (plate 2, fig. 6): Side-pieces over twice as long as wide, tips conically tapered, a small, scarcely separated lobe at base bearing two stout setæ and a number of fine hairs. Clasp-filament with a large, inflated, distorted branch, a slender inward branch at basal third long and recurved, a small branch at outer third, curved, with a bent divided tip, apex slightly inflated, bearing a series of spines at tip, outer aspect pilose, a large inward inflated projection at outer third bearing a long marginal row of coarse teeth and a shorter finer submarginal row. Harpes flat, tapering outwardly, inner margin revolute, tip dentate. Harpagones and unci forming basal cones. Basal appendages represented by two groups of five spines each, remote from one another.

Larva, Stage IV (plate 86, fig. 271).—Head rounded in front, sides oblique, posterior angles prominent, rounded; occipital foramen visible near the sides in dorsal aspect; antennæ moderate, uniform, a single small seta at outer fourth; head-hairs single, ante-antennal tuft multiple. Lateral comb of eighth segment of about eleven scales in a single irregular row. Air-tube slightly tapered, uniform, about three times as long as wide, roughened with short, closely set denticles; a small hair on dorsal aspect near tip, four on ventral aspect, and a longer hair laterally about the middle; terminal hooks moderate. Anal segment longer than wide, with a rather large dorsal plate; dorsal tuft of five hairs on each side, lateral hair single, arising from the angle of the plate; subventral hair long, single, arising from a small, independent plate. Anal gills about twice as long as the segment, stout, tapering to tip, slightly flexuous. A pair of toothed dorsal hooks on seventh abdominal segment.

The life history and habits of *Sabethinus identicus* are identical with those of *Sabethinus undosus,* the larvæ in several instances occurring associated with larvæ of that species. Mr. Busck says: "The large, fat, milky-white larva is strongly segmented and has a short tube."

Digitized by Google

Known to us only from the Canal Zone, Panama, but probably extends farther southward.

Tabernilla, larvæ in bamboo, May 9, 16, 22 (A. Busck); Tabernilla (A. H. Jennings).

The species *identicus* is closely allied to *Sabethinus undosus*. The thoracic ornamentation varies from metallic blue through golden-green to purple; the abdomen is metallic blue, without any green tint such as occurs in *undosus*.

Genus SABETHOIDES Theobald

Sabethes Theobald (in part), Mon. Culic., ii, 345, 1901.
Sabethoides Theobald, Mon. Culic., iii, 328, 1903.
Sabethoides Lutz, in Bourroul, Mosq. do Brasil, 56, 1904.
Sabettoides Blanchard, Les Moustiques, 423, 1905.
Sabethoides Theobald, Genera Ins., Culicid., 39, 1905.
Sabethes Dyar & Knab (in part), Proc. Biol. Soc. Wash., xix, 168, 1906.
Sabethoides Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.
Sabethes Dyar & Knab (in part), Can. Ent., xxxix, 49, 1907.
Sabethoides Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 208, 1907.
Sabethoides Theobald, Mon. Culic., iv, 617, 1907.
Sabethoides Peryassú, Os Culicid. do Brazil, 38, 1908.
Sabethes Williston (in part), No. Amer. Dipt., 3 ed., 108, 1908.
Sabethoides Pazos, San. y Ben., ii, 41, 1909.
Sabetes Pazos (in part), San. y Ben., ii, 44, 1909.
Sabethoides Theobald, Mon. Culic., v, 574, 1910.

The type species are: of *Sabethoides* Theobald, *Sabethoides confusus* Theobald; of *Sabettoides* Blanchard, *Sabethoides confusus* Theobald.

GENERIC DIAGNOSIS OF ADULT FEMALE (MALE UNKNOWN):

Head moderate, the eyes large, contiguous at vertex. Proboscis long and slender. Antennæ with the joints subequal, the hairs of the whorls long and rather abundant. Palpi very short, slender. Vestiture of broad appressed scales, the occiput without erect forked scales, the mesonotum without setæ on the disk. Prothoracic lobes large, approximate dorsally. Abdomen subcylindrical, blunt at the tip. Legs long and slender. Claws small, equal and simple.

The genus is confined to the tropical portions of the American continent.

The genus *Sabethoides* is closely allied to *Sabethes*. We separate it on the character of the proboscis, which is not a strong one. It is not improbable that if a considerable number of species should be discovered, intergrades would appear compelling the union of the genera.

The larva is unknown. The adult is day-fiying, blood-sucking, and forest-inhabiting; it is rare wherever found; in the early stages it is not improbably predaceous upon the larvæ of other sabethines inhabiting bromeliads.

SABETHOIDES NITIDUS (Theobald).

Sabethes remipes Theobald (not Wiedemann), Mon. Culic., ii, 346, 1901.
Sabethes nitidus Theobald, Mon. Culic., ii, 347, 1901.
Sabethes nitidus Theobald, Mon. Culic., iii, 326, 1903.
Sabethoides confusus Theobald, Mon. Culic., iii, 328, 1903.
Sabethoides confusus Theobald, Gen. Ins., Culicid., 39, 1905.
Sabethoides confusus Blanchard, Les Moustiques, 423, 1905.
Sabethes cyaneus Dyar & Knab (not Fabricius), Proc. Biol. Soc. Wash., xix, 168, 1906.
Sabethoides confusus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.
Sabethoides cyaneus Dyar & Knab (not Fabricius), Journ. N. Y. Ent. Soc., xv, 208, 1907.
Sabethoides cyaneus Busck (not Fabricius), Smiths. Misc. Colls., quar. iss., iii, 71, 1908.
Sabethoide confusus Peryassú, Os Culicid. do Brazil, 313, 1908.
Sabethoides confusus Theobald, Mon. Culic., v, 584, 1910.

ORIGINAL DESCRIPTION OF SABETHES NITIDUS:

♀.—Head with peacock blue and green scales with a row of thick short dark brown bristles projecting forwards over the eyes; palpi very short, brown, with

Digitized by Google

a few spines at the apex; proboscis dark brown, rather swollen at the apex, minutely hairy; clypeus frosty grey; basal joint of antennæ frosty grey, remainder brown, densely pilose, but not much more so as in the ♀, joints much about the same length.

Thorax black, with flat peacock-blue and green scales, the back of the mesonotum and scutellum covered with large flat metallic green and bronzy scales, a tuft of dark scales just in front of the root of the wing. Metanotum dark brown, almost black, with four deep brown chaetæ; pleuræ black, with a large patch of white scales.

Abdomen with the basal segment metallic green, remainder brilliantly coloured with green, mauve, blue, white and yellow; the colouring varies in different lights; when viewed from above the abdomen is deep metallic blue with basal coppery bands; when viewed laterally the abdomen is bright apple green, with basal mauve bands and white basal lateral spots and yellow venter; now and then, as the sun strikes the scales, red and yellow colours appear; the apex of the abdomen is provided with dense brown bristles.

Legs metallic blue and violet or rich purple; coxæ dark, with patches of white scales; the legs are not provided with paddles; last three mid tarsi white underneath; ungues small, equal and simple.

Wings clothed with similar formed scales to the ♂; fork-cells long, the first submarginal longer and narrower than the second posterior, its base a little the nearer the base of the wing, its stem less than half its length and shorter than the stem of the second posterior cell; mid cross-vein nearer the apex of the wing than the supernumerary and longer, posterior cross-vein level with and longer than the mid.

Halteres dark brown.

Length.—5 mm.

♂.—Head clothed with metallic green and blue scales; palpi and proboscis brown. Abdomen metallic blue with golden ventral and lateral patches, the patches being somewhat apical.

Legs much as in *S. remipes;* the mid pair with large paddle-like masses of scales, the paddle blackish, except at the apex, where it is creamy white, most of the metatarsal portion being white, the leg itself is scaled with violet and purple scales; fore and hind legs simple, the hind with the tibiæ rather expanded apically; ungues small, equal, and simple. The legs show brilliant colours at times.

Wings with typical brown *Sabethes* scales; first submarginal cell longer and narrower than the second posterior cell, its base considerably nearer the base of the wing than that of the latter; the stem rather less than one-third the length of the cell; stem of the second posterior cell nearly as long as the cell; supernumerary and mid cross-veins practically meeting in an open angle, posterior cross-vein a little longer than the mid and nearly in a line with it.

Length.—5 mm.

Habitat.—Para, Brazil (Durham).

Observations.—Described from several ♀'s and a single ♂ caught by Dr. Durham; the ♂ was unfortunately broken in mounting.

It is clearly a distinct species easily told in the ♂ by the white tipped paddle and by the position of the cross-veins in both sexes. It most nearly approaches *S. remipes*, the mid legs of the ♂ only being paddled.

ORIGINAL DESCRIPTION OF SABETHOIDES CONFUSUS:

Sabethes remipes. ♀. THEOBALD. (non Wied.)

Sabethes nitidus. ♀. THEOBALD.

(Mono. Culicid. ii., 246 (*remipes*); 247 (*nitidus*).)

♀.—Head covered with flat violet, green, and deep blue scales, looking brown in some lights.

Proboscis, palpi, and antennæ brown; basal joint of latter with grey sheen; clypeus frosty grey. Palpi very small, apparently two-jointed, possibly a small third basal joint.

Thorax black, with flat green, peacock blue and azure blue scales, the green predominating, and sometimes some dusky ones over the roots of the wings (*nitidus*); prothoracic lobes large, covered with flat green and azure blue scales; scutellum with flat metallic green, pale blue and in some lights bronzy-hued scales; metanotum deep brown to black, with four deep brown chaetæ; pleuræ blackish with dense silvery-white flat scales.

Abdomen deep metallic purple or violet, with brilliant mauve, pale blue, white and yellow scales, the pale coloured ones on each side (fig. 187) forming more or less basal spots on each side of the middle line, and a more or less distinct row beneath joining the pale scaled ventral surface. When viewed from above the abdomen seems deep metallic blue, with basal coppery bands; when viewed laterally it may be apple-green, with basal mauve bands and the pale basal spots referred to above; now and then, as the light strikes the scales, red and yellow colours appear; the apex has dense brown bristles.

Digitized by Google

Legs bronzy-brown, with violet, blue and purple reflections; in the mid legs the last three or four tarsi are irregularly white beneath; ungues equal and simple, small.

Wings clothed with *Sabethes*-like scales, brown, and the wing membrane with a brownish tinge; fork-cells long; the first sub-marginal longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem less than one-half the length of the cell; stem of the second posterior cell nearly as long as the cell; the supernumerary cross-vein very small; positions of the cross-veins variable, as a rule the mid and posterior nearly in one line and in advance of the supernumerary, or all three may be in one line. Halteres dark brown; base paler.

Length.—4.5 to 5 mm.

Habitat.—British Guiana (Low); Para (Durham); Sao Paulo, Brazil (Dr. Lutz).

Observations.—A very variable species, which presents a great variety of colours in different lights and when held in different positions. The cross-veins vary to some extent, in some the posterior is much nearer the apex of the wing than the mid, in others it is level with the mid. This species may easily be mistaken for a ♀ of *Sabethes*, but the generic characters given on page 328 will suffice to distinguish it.

Synonymy.—I have carefully examined the types of ♀ *remipes* and ♀ *nitidus* and am sure they are the same, the former had evidently been in some liquid and so the coloration of the scales had been altered, and the position of the cross-veins we now know varies in this as in other *Culices*.

DESCRIPTION OF FEMALE OF SABETHOIDES NITIDUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis long and slender, uniform, vestiture black with a slight green reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, one-seventh as long as proboscis, slender, black, a tuft of outstanding hairs at base. Antennæ moderate, the joints subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, black, whitish pruinose; hairs of whorls long, moderately dense, black. Clypeus slender, elliptical, convex, dark brown with a white pruinosity, nude. Eyes large, contiguous at vertex, black. Occiput clothed with fine shinifig metallic violet and blue scales, two brown setæ at vertex.

Prothoracic lobes large, approximate dorsally, clothed with metallic greenish-blue scales and bearing a dense row of black bristles.

Mesonotum blackish, clothed with flat metallic blue and green iridescent scales, becoming olivaceous at margins, those over roots of wings and antescutellar region with golden and coppery luster. Scutellum trilobate, densely covered with scales similar to those of tip of mesonotum, each lobe with a small tuft of brown bristles. Postnotum elliptical, prominent, dark brown, with a rounded median carina, a tuft of about ten large bristles posteriorly. Pleuræ blackish, coxæ brown, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate at tip which bears many black hairs; dorsal vestiture metallic blue and green; a row of pale violaceous basal segmental triangular lateral spots, venter pale golden, with a medioventral ridge of scales; the green dorsal color extends well down the sides at the apices of the segments; first segment dorsally more brilliantly colored.

Wings rather narrow, slightly infuscated, iridescent; petiole of second marginal cell one-half as long as its cell, that of second posterior cell nearly as long as its cell; cross-veins nearly incident; scales of veins black, with a bronzy and blue reflection, elliptical, obliquely subtruncate, those on forks of second vein denser and broader. Halteres blackish, except at base.

Legs slender, the vestiture black, with a blue and violaceous reflection, the femora pale golden beneath nearly to tip; mid tarsi with the apical half of the second, the third, and all but the tip of the fourth joint white, a black mark on under side of fourth joint; tibiæ and tarsi with coppery luster beneath. Claw formula 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Digitized by Google

The larva is not improbably an inhabitant of the water between the leaves of bromeliaceous plants and predaceous on the larvæ of other sabethids. We infer this from the rarity of the adults where found. The adult flies by day in forests and bites only during the hot hours of the day (Peryassú).

Forest regions of tropical America.

Córdoba, Mexico, adult captured, March 21, 1908 (F. Knab); San Rafael, Vera Cruz, Mexico, June 22 (C. H. T. Townsend); Sonsonate, Salvador, August 29, 1905 (F. Knab); Rio Aranjuez, near Puntarenas, Costa Rica, September 13, 1905 (F. Knab); Las Loras, near Puntarenas, Costa Rica, September 8, 1905 (F. Knab); Santo Domingo, Costa Rica, September 19, 1905 (F. Knab); Esparta, Costa Rica, September 18, 1905 (F. Knab); Bluefields, Nicaragua (W. F. Thornton); Trinidad, British West Indies, June, 1905 (A. Busck). The species is also reported from Rio de Janeiro; Bahia; São Paulo and Taubaté, State of São Paulo; Juiz de Fóra, Oliveira, Descalvado, Lavras, Barbacena, Ouro-fino, Cysneiros, and Fazenda da Serra, in the State of Minas Geraes, Brazil (Peryassú).

This rare species (*Sabethoides nitidus*) needs further study. It is not improbable, following the usual condition, that the specimens from Mexico and Central America represent a different species from the one in Trinidad. We have not sufficient material to decide the point, only one specimen from Trinidad being before us. If this should prove to be the case, the Central American form will need a new name, as all the names in the synonymy refer to the Brazilian form, including in its range Trinidad and Guiana. The synonymy is considerably involved, owing to Theobald having mistaken females of a species of *Sabethes* with scale-tufts on the legs for males of *Sabethoides*. He first described the female as the female of *Sabethes remipes* Wiedemann; later, recognizing his error in part, he redescribed the female as *Sabethes nitidus*, but associated with it a male of *Sabethes* with tufted legs; still later he again redescribed these females as *Sabethoides confusus*, leaving the name *nitidus* to stand for the male above associated, but wrongly, as the name was obviously founded upon the female. We note that in the original description of *Sabethes nitidus* (female) the probosis is said to be swollen at the apex, which is at variance with the generic character. As Theobald had several specimens before him it is quite likely that his description of the female is a composite of two different insects. However, as he himself states that *Sabethoides* is founded on the specimen he described as *Sabethes nitidus*, we feel obliged to accept this synonymy.

Genus LIMATUS Theobald.

Limatus Theobald, Mon. Culic., ii, 349, 1901.
Simondella Laveran, C. R. hebd. Soc. Biol., liv., 1160, 1902.
Aedeomyia Neveu-Lemaire (in part), Mém. Soc. Zool. de France, xv, 223, 1902.
Limatus Giles, Gnats or Mosq., 2d ed., 513, 1902.
Limatus Theobald, Mon. Culic., iii, 333, 1903.
Limatus Lutz, in Bourroul, Mosquitos do Brasil, 57, 1904.
Limatus Blanchard, Les Moustiques, 429, 1905.
Limatus Theobald, Gen. Ins., Culic., 40, 1905.
Wyeomyia Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 227, 1906.
Limatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.
Subfamily Limatinæ Theobald, Mon. Culic., iv, 20, 627, 1907.
Limatus Dyar & Knab, Can. Ent., xxxix, 49, 1907.
Subfamily Limatinæ Peryassú, Os Culicideos do Brazil, 30, 319, 1908.
Limatus Williston, No. Amer. Dipt., 3 ed., 108, 1908.
Limatus Pazos, San. y Ben., ii, 41, 44, 1909.
Subfamily Limatinæ Theobald, Mon. Culic., v, 595, 1910.

The type species are: of *Limatus* Theobald, *Limatus durhamii* Theobald; of *Simondella* Laveran, *Simondella curvirostris* Laveran.

Digitized by Google

GENERIC DIAGNOSIS OF ADULT:

Head moderate, eyes separated by a wedge-shaped integument which terminates in front in a large quadrate projection. Palpi short in both sexes, the joints fused. Antennæ with the joints subequal, similar in the sexes, those of the male scarcely more plumose than those of the female. Prothoracic lobes large, well separated dorsally, with coarse setæ along their front margins. Vestiture of flat appressed scales, occiput without erect forked scales, mesonotum without setæ on disk. Abdomen subcylindrical, tip blunt in the female. Legs with the claws small, simple in both sexes, the hind pair with but a single claw. Proboscis of female rather short and stout; of male, either bent beyond the middle, with an enlargement of scales, or straight and strongly swollen at the tip.

GENERIC DIAGNOSIS OF LARVA:

The larvæ have the characters of those of the genus *Wyeomyia*, so that we have included the species of both genera in a common table. Head flattened, broad, rounded, the antennæ small; mouth-brushes thick but short; air-tube moderate, with scattered hairs, no pecten. A comb of separate scales, few in number, on the sides of the eighth abdominal segment. Anal segment with a dorsal plate, long-haired dorsal and lateral tufts and short subventral hair; anal gills moderate.

The genus is confined to the tropical parts of the American continent.

Limatus is closely related to *Wyeomyia;* the adults differ only in the loss of one of the hind tarsal claws, which affects both sexes. This condition is foreshadowed in some of the species of *Wyeomyia* (especially *W. codiocampa* D. & K.), and represents only an extreme development of the condition where one of the hind tarsal claws is smaller than the other. The larvæ are inseparable generically from *Wyeomyia.* However, in spite of the close affinity, we have thought it advisable to recognize the genus. All the species are more gaudily ornamented on the mesonotum than the species of *Wyeomyia,* and may be superficially recognized by this character.

The genus, together with *Joblotia,* was placed by Theobald in his subfamily Trichoprosoponina, on account of the presence of a few scales on the postnotum. We have found that scales are present on the postnotum of certain species of *Sabethes* and *Sabethinus* and not on others; therefore the character is not even generic. Later, Theobald established a subfamily (Limatinæ) for the genus *Limatus,* on the character of the bent proboscis (Mon. Culic., iv, 18, 1907). This modification is present only in the male of some species, and, like other secondary sexual characters, it has no deep significance. To this genus should be referred *Dendromyia paraënsis* Theobald (Mon. Culic., iii, 316, 1903), described from a single, apparently much rubbed, female. The description, as far as it goes, fits *Limatus* in every detail: yellow spot upon the vertex, the differently colored first abdominal segment, the lateral spots of the abdomen, and, above all, the peculiar scaling of the wing-veins. The specimen is probably referable to *L. durhamii,* which Theobald had from the same locality (Pará), but we are unwilling to so refer it without examination of the type.

The larval history and habits, so far as we know them, are the same as those species of *Wyeomyia* that inhabit bamboo-joints or cocoanut-shells. The larvæ occur in cocoanut-husks and similar locations. The adults are diurnal, frequenting forests.

TABLES OF THE SPECIES OF LIMATUS.

ADULTS, STRUCTURE AND COLORATION.

1. Abdomen with the colors separated on the sides in an irregular line; proboscis of male with a bend beyond the middle, curved beyond the bend, heavily scaled at bend and tip..... 2
   Abdomen with the colors separated on the sides in a straight line; proboscis of male straight, strongly enlarged at tip
   methysticus Dyar & Knab (p. 48)
2. First abdominal segment pale golden-scaled..... *durhamii* Theobald (p. 42)
   First abdominal segment black-scaled, with bronzy luster
   cacophrades Dyar & Knab (p. 45)

MALE GENITALIA AND LARVÆ.

(See the tables under *Wyeomyia*, pages 55 and 57.)

Digitized by Google

LIMATUS DURHAMII Theobald.

Limatus durhamii Theobald, Mon. Culic., ii, 350, 1901.
Simondella curvirostris Laveran, C. R. heb. Soc. Biol., liv, 1160, 1902.
Aedeomyia curvirostris Neveu-Lemaire, Mem. soc. zool. France, xv, 223, 1902.
Limatus durhamii Giles, Gnats or Mosq., 2 ed., 513, 1902.
Limatus durhamii Theobald, Mon. Culic., iii, 333, 1903.
Limatus durhami Blanchard, Les Moustiques, 429, 1905.
Limatus durhami Goeldi, Os Mosq. no Pará, 122, 1905.
Limatus durhamii Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.
Wyeomyia durhami Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 228, 1906.
Wyeomyia durhami Dyar, Proc. Ent. Soc. Wash., viii, 19, 1906.
Limatus durhami Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 248, 1907
Limatus durhamii Theobald, Mon. Culic., iv, 627, 1907.
Limatus durhami Peryassú, Os Culicideos do Brazil, 319, 323, 327, 357, 367, 369, 1908.
Limatus durhami Newstead & Thomas, Ann. Trop. Med. & Par., ser. T. M., iv, 148, 1910.
Limatus durhamii Theobald, Mon. Culic., v, 596, 1910.

ORIGINAL DESCRIPTION OF LIMATUS DURHAMII:

Thorax ornamented with violet, golden-yellow and bronze, the golden-yellow forming three patches, looking like the top of a cross. Abdomen almost black, with basal lateral white triangular spots, venter creamy-white. Legs bronzy-brown, unbanded. Bases of the wings pale yellowish.

♀. Head covered with flat bronzy-brown and dull ochraceous scales; sides of the head white; clypeus brown; proboscis black; palpi and antennæ brown.

Thorax with dense flat scales, very convex at the apex; prothoracic lobes clothed with golden yellow flat scales and rich brown bristles; mesothorax clothed with rich purple scales and with a golden yellow median line on the front half, and a lateral transverse line on each side, the anterior border and sides also with golden yellow scales, back portion of the mesothorax with duller purple and brown scales and a few golden ones; scutellum with flat purple scales, border-bristles golden-brown, there being four large ones to the median lobe and two median small ones; in front of the roots of the wings is a small tuft of black bristles and a golden-brown tuft behind; pleuræ with silvery-white scales; scutellum with a tuft of golden-brown bristles on its apical half and two rows of small flat golden scales.

Abdomen black with basal white lateral spots; first segment with creamy yellow scales; venter creamy white, apex slightly bristly.

Legs dark brown with bronzy reflections, bases of the legs and ventral surface of the femora creamy white; ungues small, equal and simple.

Wings with the veins covered with rather broad long dark scales, with the apices either flat or convex, the former slightly asymmetrical; fork-cells long, the first sub-marginal considerably longer and slightly narrower than the second posterior, its base much nearer the base of the wing than that of the second posterior, its stem about one-third the length of the cell; stem of the second posterior rather more than two-thirds the length of the cell; supernumerary and mid cross-veins united at an obtuse angle; posterior cross-vein not quite its own length behind the mid.

Halteres mostly black, basal part of stem yellow.

Length.—3 to 3.5 mm.

Habitat.—Para, Brazil (Dr. Durham).

Observations.—Described from a series caught by Dr. Durham. It is a most beautiful species with brilliant thorax, the three golden marks on the mesonotum looking like the upper part of a cross. Females only have been received. They seem to be intermediate between *Sabethes* and *Trichoprosopon*, but clearly come in the same section as the latter owing to the metathoracic scales, but they differ from *T. nivipes* in that the venation is of *Culex* type.

ORIGINAL DESCRIPTION OF SIMONDELLA CURVIROSTRIS:

Ce petit moustique habite les bois; il se rencontre aux environs de Rio de Janeiro à 300–500 mètres d'altitude. Très probablement il pond dans les petits dépôts d'eau accumulée à l'aisselle des bromelia ou d'autres plantes, d'où la difficulté d'obtenir ses larves.

Le corps mesure 4 millimètres de longueur, non compris la trompe.

Tête.—1o Trompe. Chez la mâle, elle a la forme d'une faucille ou d'une serpe, c'est-à-dire qu'elle est formée d'une tige droite qui se continue par un arc à convexité supérieure, cet arc est comme articulé par un coude avec la tige et peut s'inflechir sur elle plus ou moins. La partie droite est couverte d'écailles sombres et plus longue

Digitized by Google

que l'arc terminal. La partie arquée est élargie à ses extrémités, et rétrécie en son milieu. Près de son origine elle est sombre à la face supérieure et présente, à la face inférieure, un petit disque ovale garni d'écailles d'un bleu très vif. La portion médiane rétrécie de l'arc est garnie d'écailles claires. La portion terminale est renflée en un pinceau de coloration sombre, dont l'extrémité porte des poils courts.

Chez la femelle, la trompe ne présente pas de coude, c'est une tige renflée en pinceau à son extrémité. Sauf à la base où elle a des écailles claires, elle est partout recouverte d'écailles sombres. L'extrémité des labelles est couronnée de poils courts. En général cette trompe est tenue légèrement courbée en arc, l'insecte la redresse pour piquer.

La longueur de la trompe, chez le mâle comme chez la femelle, est sensiblement égale à la longueur de l'abdomen. Elle est donc proportionnellement plus longue que chez la plupart des autres espèces. La piqûre de la femelle sur l'homme est assez légère; le mâle est incapable de piquer.

2o Palpes.—Semblables chez les deux sexes, très courts (moins de 1/10 de la longueur de la trompe), velus, fusiformes. Ils paraissent formés de trois articles dont la séparation est difficile à reconnaître. Leur coloration est sombre.

3o Antennes.—Semblables chez les deux sexes, à 14 articles dont le premier est un tubercule nu; les autres articles sont constitués par une tige noueuse et irrégulière dont la portion basilaire est claire et très courte; la portion supérieure sombre forme les 4/5 de la longueur de l'article. A la base de cette portion sombre existe un verticille de grandes soies, la même portion sombre porte des soies petites sur toute sa longueur; la portion claire est nue.

4o Yeux, fortement rapprochés, à reflet sombre.

5o Occiput couvert d'écailles blond-argenté au sommet de la tête, violet foncé en arrière des yeux, argentées et violacées sur les côtés. En arrière de l'occiput on voit une bande transversale, la nuque, couverte d'écailles blond-doré. Il existe peu de différence pour cette partie de la tête entre les deux sexes.

Thorax.—Semblable chez les deux sexes, revêtu d'écailles de plusieurs dimensions, blond-doré, blond-argenté, violet foncé, certaines en partie bleu en partie rouge-violet. A la partie dorsale du mésothorax les écailles forment un dessin de marqueterie violet-noir sur fond doré. Il existe des faisceaux de poils sur les côtés du thorax.

Le scutellum a le lobe médian proéminent, terminé d'ordinaire par deux soies courtes. Le bord de ce lobe et des lobes latéraux porte en outre une douzaine de soies par groupes de deux, alternativement longues et courtes.

Le metanotum porte des écailles et un bouquet de poils au milieu de son bord postérieur.

Abdomen.—Etroit dans sa partie antérieure et renflé au niveau des cinq derniers anneaux. Chez la femelle il est noir violacé à la face supérieure, sauf le premier anneau qui paraît clair; il est blond argenté à la face ventrale. Chez le mâle les anneaux présentent chacun une bande transversale argentée alternant avec une bande noire, à leur face dorsale. La face ventrale est argentée avec une bande transversale noire près de l'extrémité. Le mâle porte à l'extrémité du dernier anneau deux tubercules latéraux garnis d'un faisceau de poils. En dedans de ces tubercules on voit deux crochets mousses assez petits.

Les *ailes* sont relativement grandes. Au repos, elles dépassent l'abdomen d'environ ¼ de leur longueur chez la femelle et de ⅛ chez le mâle. Elles sont veinées comme celles des Culex; la cellule en fourchette antérieure est plus longue de ⅓ environ que la cellule en fourchette postérieure.

Les côtes et les bords sont garnis d'écailles sombres serrées. Il n'existe pas de taches.

Les *pattes* sont allongées, noires en dessus, gris argenté en dessous. Les deux premières sont bi-ongulées, *la dernière porte un seul ongle.* Chez la femelle les ongles sont petits, simples, et très peu courbés.

Chez le mâle il en est de même, toutefois la patte médiane porte ordinairement un ongle fortement recourbé dont l'extrémité se relève élégamment de façon à rappeler un S. L'autre ongle de la même patte est en général peu courbé et semblable aux ongles des autres pattes.

Les pattes de la paire postérieure sont munies, principalement au fémur et au tibia, de nombreuses et fines épines. A l'état de repos, ces deux pattes sont relevées et gracieusement recourbées en arrière jusqu' au dessus de la tête.

M. Laveran.—Dans la lettre d'envoi de la note qui précède, M. le Dr. Simond m'écrit que le Culicide décrit par lui appartient probablement à un genre nouveau. Je partage entièrement cette manière de voir et puisque M. Simond m'a laissé le soin de donner un nom à ce très intéressant Culicide je l'appellerai *Simondella curvirostris.* Le genre *Simondella* est bien caractérisé par la forme en serpe de la trompe chez le mâle et par ce fait que les pattes de la paire postérieure sont uni-ongulées dans les deux sexes. Chez la femelle le proboscide est plus long que chez la plupart

Digitized by Google

des Culicides et les palpes sont très courts. Les ailes sont veinées comme celles des Culex. Les tarses ne sont pas annelés de blanc.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF LIMATUS DURHAMII:

Female.—Proboscis very slightly swollen at tip, labellæ small, rounded, with outstanding setæ; vestiture black with bronzy reflection. Palpi short, one-eighth as long as the proboscis, black, with many dense outstanding setæ. Clypeus small, rounded triangular, brown, pruinose. Antennæ moderate, joints subequal, rugose, coarsely pilose, black; tori subspherical with a cup-shaped apical excavation, brown, silvery pruinose; hairs of the whorls sparse, rather long, black. Eyes rather broadly separated on the vertex, black; a quadrate luteous prominence in front. Occiput small, clothed with flat black scales, with blue and green iridescence; a patch of golden-yellow ones at vertex; a pair of coarse brown bristles projecting at vertex, a row of smaller black setæ at margin of eyes.

Prothoracic lobes large, prominent, well separated dorsally, densely clothed with large, flat, elliptical, golden scales; a row of black setæ on apical margin. Mesonotum densely clothed with elliptical, flat, brown scales with a metallic-blue reflection, a large wedge-shaped dorsal patch from anterior margin and a curved patch on each side before wing-insertion golden; some scattered golden scales behind. Scutellum weakly trilobate, vestiture of brown scales similar to that of mesonotum, each lobe with a group of black bristles. Postnotum elliptical, prominent, with a high median carina, a tuft of brown bristles posteriorly preceded by one or two flat golden scales. Pleuræ brown, coxæ yellowish, clothed with elliptical, flat, silvery-white scales in patches, a broad area along upper margin of pleura golden.

Abdomen short subcylindrical, subcompressed, the tip truncate, with many terminal pale bristles; dorsal vestiture black, with bronzy and purple reflection; venter pale yellowish-silvery or golden, forming triangular incisions on the sides on the anterior parts of the segments into the black lateral color, often largest on the fifth to seventh segments; first segment clothed above with flat pale-golden scales and numerous pale-brown hairs.

Wings moderate, hyaline. Petiole of second marginal cell two-fifths as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant less than its own length from anterior cross-vein. Scales of veins elliptical, many obliquely subtruncate, black with a bronzy reflection, larger and denser at the forks of the second vein. Halteres pale, with large blackish knobs.

Legs moderate, slender, black with blue and bronzy reflection, femora pale golden beneath, tibiæ and tarsi also with golden luster below. Claw formula, 0.0–0.0–0.–.

Length: Body 3 mm.; wing 3 mm.

Male.—Similar to the female. Proboscis angularly bent beyond the middle, the scales in the region of the bend and at the apex dense and roughened, deep black, but marked with a golden luster between the two groups of black scales. Antennæ with the joints slightly shorter than in the female, hairs of whorls somewhat longer, ciliation coarse, sparse. Abdomen short, cylindrical, somewhat expanded toward the apex, with numerous coarse brown bristles at tip. Hind legs silvery beneath throughout; mid legs with the third, fourth, and fifth tarsal joint silvery beneath. Claw formula, 0.0–0.0–0.–.

Length: Body about 2 mm.; wing 2.5 mm.

Genitalia (plate 2, fig. 3): Side-pieces small, stout, tapering, with fine setæ at tips, deeply cleft for insertion of clasp-filaments. Clasp-filament large, shaft thick and uniform, bent outward at tip, ending in a point with a row of short, stout hooks, continued basally by setæ; an inner appendage of about the same size as tip of filament, with an angular projection bearing a row of setæ, two small triangular scales at tip. Harpes stout, enlarged at base, tips divided

Digitized by Google

into a row of teeth. Harpagones inconspicuous. Unci not prominent: a row of long stout setæ in the midline.

Larva, Stage IV (plate 86, fig. 272).—Head rounded, flattened at sides, hind angles broadly rounded, occipital foramen comparatively small; antennæ moderate, slender, with a single hair at outer third; head-hairs all single. Lateral abdominal hairs in sixes on first two segments, in fours on third to fifth, in threes on sixth; subdorsal hairs long, double. Lateral comb of eighth segment of four well-separated spines, followed by a single hair. Air-tube fusiform, the tip small, about four times as long as the basal width; a row of three double tufts on the dorsal aspect, five such on ventral aspect, with a single hair near the base on each aspect; terminal hooks small. Anal segment longer than wide, with a rather small dorsal plate; dorsal tuft of seven long hairs on each side; lateral tuft of two long hairs from lower angle of plate; subventral tuft of three long hairs. Anal gills twice as long as the segment, broad, with rounded tips, equal.

The larvæ inhabit water in hollow trees, cacao-husks, and the like, usually in very foul water. According to Dr. Goeldi, the larvæ also occur in the leaves of bromeliaceous plants and "banana-sororoca," but none of our collectors have found them in such situations. They are confined to similar locations to the larvæ of *Joblotia digitatus*, which they often accompany. The egg is undescribed. The adults are diurnal, frequenting forests. Peryassú mentions the egg taken from the ovary of a female; its length 0.68 mm., width, 0.24 mm. He says they are laid singly or in small groups. The adults bite, but are not apparently very fierce. Peryassú states that they attack man and horse with avidity, but Dr. Goeldi was unable to induce any of numerous specimens to take blood.

Tropical America from São Paulo, Brazil to Trinidad.

Montserrat, Trinidad, larvæ in old calabash fruit in the forest, June 29 (A. Busck); Montserrat, Trinidad, larvæ in a hollow tree near houses, June 29 (A. Busck); Montserrat, Trinidad, larvæ in old cacao-shells, July 2, 1905 (A. Busck); Port of Spain, Trinidad, larvæ taken in a split bamboo on the ground, containing vegetable débris; very little water; vegetable feeders; the female sucks blood in the field, but does not enter houses (F. W. Urich); Potaro, British Guiana, May, 1909 (H. W. B. Moore). Reported also from Pará, Brazil (Theobald, Goeldi); Rio de Janeiro, Brazil (Simond); states of São Paulo, Rio de Janeiro, Bahia, Goyaz, and Pará, Brazil (Lutz).

We have *Limatus durhamii* in our region from Trinidad; the *Limatus* from Central America are different species, while no species of *Limatus* occurs in the West Indies to our knowledge. Peryassú includes the species under those with larvæ "essentially carnivorous or cannibalistic." These larvæ are normally scavengers and we think attack living insects only when pressed by hunger.

LIMATUS CACOPHRADES Dyar & Knab.

Wyeomyia durhami Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 228, 1906.
Limatus durhamii Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.
Limatus durhami Busck (not Theobald), Smiths. Misc. Colls., quart. iss., lii, 74, 1908.
Limatus cacophrades Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 266, 1909.

ORIGINAL DESCRIPTION OF LIMATUS CACOPHRADES:

FEMALE.—Occiput black with blue and green iridescence, a patch of golden yellow scales at the vertex. Prothoracic lobes golden. Mesonotum dark metallic violet-scaled with golden markings, a median wedge-shaped one anteriorly and a semicircular one before the root of the wing. Scutellum dark violet-scaled. Postscutellum bronzy brown-scaled, with blue, coppery, or golden reflections. Pleura clothed with golden scales above, silvery ones below. Abdomen with the dorsal vestiture black,

Digitized by Google

with coppery and blue reflections, the venter yellowish silvery, the colors indented on the sides. Legs bronzy black, with a brighter luster beneath.

MALE.—Proboscis with a tuft beyond the middle, the tip curved and slightly thickened by scales. Coloration as in the female, except that the mid and hind legs are white-marked beneath.

Twelve specimens, selected from a series, Tabernilla, Canal Zone, Panama (A. H. Jennings).

Type no. 12130, U. S. N. M.

This species was formerly identified as *L. durhami* Theobald, but differs therefrom most obviously in the color of the postscutellum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF LIMATUS CACOPHRADES:

Female.—Proboscis rather long, slightly swollen at tip, labellæ small, rounded, with outstanding setæ; vestiture black with bronzy reflection. Palpi minute, about one-tenth as long as proboscis, black, with dense outstanding setæ. Clypeus small, rounded triangular, black, slightly pruinose. Antennæ moderate, the joints subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, black, silvery pruinose; hairs of whorls sparse, rather long, black. Eyes broadly separated on vertex, black; a quadrate luteous prominence in front. Occiput small, clothed with flat black scales with a blue and green iridescence, a patch of golden-yellow ones at vertex; cheeks silvery white.

Prothoracic lobes large, prominent, well separated dorsally, densely clothed with large, flat, elliptical golden scales; a row of black setæ on the margin. Mesonotum densely clothed with elliptical, flat, deep-purple scales with metallic reflection; a large wedge-shaped dorsal patch from anterior margin to near middle; an arcuate band on each side, one limb resting on root of wing, these markings of golden scales. Scutellum weakly trilobate, vestiture of dark-violet scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, with a high median carina, deep brown, a tuft of black bristles posteriorly, preceded by one or two flat golden scales. Pleuræ brown, coxæ yellowish, clothed with elliptical, flat silvery-white scales in patches; a broad area along upper margin of pleuræ golden-scaled.

Abdomen short, subcylindrical, tip truncate, with many terminal pale bristles; dorsal vestiture black, with a strong coppery and blue reflection; first abdominal segment clothed with bronzy-brown scales with a dark-blue reflection in some lights, a coppery or golden one in others, numerous pale-yellow hairs; second abdominal segment with a median, basal, triangular, pale iridescent patch; venter yellowish-silvery scaled, forming broadly triangular incisions on the sides on the anterior parts of the segments into the black lateral color, most pronounced on fourth, fifth, and sixth segments.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins rather broadly triangular, black, with a bronzy reflection, larger and denser on forks of second vein and apices of third and fourth veins.

Legs rather slender, black, with bronzy and blue reflection, the femora and hind tibiæ pale golden beneath, the tibiæ and tarsi with bright bronzy luster below. Claw formula 0.0–0.0–0–.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Similar to the female. Proboscis angularly roughened beyond the middle, scales at apex also denser and roughened, deep black, marked with silvery luster below between the median and apical black scales. Antennæ with the joints hardly shorter than in the female, hairs of whorls somewhat longer, ciliation coarse, sparse. Abdomen short, subcylindrical, somewhat expanded towards apex, with numerous coarse, pale-brown bristles at tip. Hind legs silvery beneath throughout; mid legs with fourth and fifth joints and all but base

Digitized by Google

of third tarsal joint silvery beneath. Wings hardly narrower than in the female, the stems of the fork-cells somewhat longer. Claw formula 0.0–0.0–0–.

Length: Body about 2 mm.; wing 2.5 mm.

Genitalia (plate 2, fig. 2): Side-pieces short, about twice as long as wide, tips excavate for the insertion of the clasp-filament; clasp-filament long, with uniform stem, the tip divaricate, the inner branch smaller, cleft at tip, and bearing a row of setæ; outer branch with a row of coarse, blunt teeth. Harpagones and harpes small, the later toothed at tip. Basal appendages low, rounded, setose.

Larva, Stage IV (plate 86, fig. 273).—Head rounded, about as long as wide, a slight notch at insertion of antennæ, front margin evenly arcuate. Antennæ small, cylindrical, smooth; a single hair at outer fourth, a long hair, two short ones, and a long digit at tip. Eyes small, round. All three pairs of dorsal head-hairs and ante-antennal hairs simple. Mental plate triangular, short, a large apical tooth constricted on the sides and seven on each side which are somewhat more remote basally. Mandible quadrangular, the dentition highly produced; a filament from a notch before apex; an outer row of cilia; a row of six long filaments from outer margin; dentition of five teeth on a thick process, the second one longest; a serrate filament within; process below short and blunt, lying in line with front margin, obscurely furcate, with tufts of hair; a row of long hairs within; basal angle absent; a row of long hairs at base. Maxilla hemispherical, short, and broad; tip truncate with a series of short triangular teeth; inner half with two rows of cilia; outer half with a row of long cilia at middle, preceded by a long articulated filament; a tooth-shaped spine near base, with a band of cilia; a small spine near palpus. Palpus proportionately rather large, with two moderate and two minute digits. Thorax rounded, moderate; hairs rather abundant, not long. Abdomen long and slender, the anterior segments shorter; lateral tufts multiple on first two segments, triple on third to sixth. Tracheal tubes slender. Air-tube small, basal half thick, outer half very strongly tapered; a row of three double hair-tufts on dorsal, seven on ventral aspect; no pecten. Lateral comb of eighth segment of six or seven well-separated scales in a line; single scale smooth, thorn-shaped, with elliptical base. Anal segment about as long as wide, with a dorsal plate reaching well down on sides; dorsal tuft of six long hairs on each side; two long lateral hairs; no ventral brush, but a tuft of three long hairs on each side of the ventral line. Anal gills twice as long as the segment, with rounded tips, both pairs equal in length.

The larvæ live in water of a foul nature, rich in decomposed vegetable matter, collected in cocoanut-husks, palm-leaves, and various receptacles on the ground. The eggs are unknown. The adults are diurnal and will bite man, being fairly aggressive for a sabethine. They frequent forests.

Central America, Panama, and probably southward.

Sonsonate, Salvador, larvæ in cocoanut-husks in a plantation, August 30, 1905, preyed upon by *Megarhinus moctezuma* (F. Knab); Port Limon, Costa Rica, larvæ in an old sprinkling-can, found in a swamp near town, associated with *Aëdes calopus* (F. Knab); Tabernilla, Canal Zone, Panama, larvæ in an old tin bucket, in water in leaves of a bromeliaceous plant, in bamboo, and in a small wooden barrel near houses, July 10–18, 1907, associated, in the case of the bromelia larvæ with *Culex jenningsi* and *Wyeomyia circumcincta* (A. Busck); in rain-water in a fallen palm-leaf on the bank of the upper Chagres River, Panama, June 7, 1907, associated with the larva of *Anopheles eiseni* (A. Busck); Bas Obispo, Canal Zone, Panama, larvæ from artificial receptacle, July 16, 1908, associated with tadpoles and larvæ of *Culex* (A. H. Jennings); Panama territory, near Ancon, Canal Zone, in an old tin can, July 22, 1908 (A. H. Jennings);

Digitized by Google

Tabernilla, Canal Zone, Panama, in bamboo, July 30, December 22, 1908, associated with *Hæmagogus splendens* (A. H. Jennings); Cucaracha, Canal Zone, Panama, larvæ in an artificial receptacle, December 27, 1907 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, larvæ in a galvanized pail left in the edge of a bush well up on the hillside above hotel; a striking sabethine larva, yellowish white, with black median stripe along the body to near tail, where it ceases and becomes a dead white and noticeably different from the rest of the body; observed larvæ feeding on smaller individuals; January 25, 1908 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, adult caught in the bush, January 4, 1908 (A. H. Jennings); Lion Hill, Canal Zone, Panama, adults captured (A. Busck); Bluefields, Nicaragua, adults captured (W. F. Thornton); Zent, Costa Rica, adults captured, September 26, 1905 (F. Knab).

Limatus cacophrades is closely allied to *Limatus durhamii* Theobald, and was at first identified as that species. The species may be separated by the difference in the color of the vestiture of the first abdominal segment, care being taken not to confuse the metallic reflection of those scales in *cacophrades* with the purely golden ones of *durhamii*.

LIMATUS METHYSTICUS Dyar & Knab.

Limatus methysticus Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 266, 1909.

ORIGINAL DESCRIPTION OF LIMATUS METHYSTICUS:

Similar to *L. cacophrades* D. and K. Thorax with five irregular golden patches. Abdomen silvery beneath, the colors separated on the sides in a straight line. Middle legs with the last three tarsals silver white beneath in the female, white all around in the male; hind legs with the last joint silvery white beneath in both sexes. Proboscis of the male straight, slender, swollen at tip.

Four specimens, Port Limon, Costa Rica, September 28, 1905 (F. Knab).

Type no. 12131, U. S. N. M.

DESCRIPTION OF FEMALE AND MALE OF LIMATUS METHYSTICUS (LARVA UNKNOWN):

Female.—Proboscis moderate, slightly swollen toward tip, labellæ small, rounded, with outstanding setæ; vestiture slightly roughened, black with a bronzy reflection. Palpi small, about one-eighth as long as proboscis, black-scaled, with dense outstanding setæ. Clypeus small, rounded triangular, blackish, slightly pruinose. Antennæ rather long, the joints subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, silvery pruinose; hairs of whorls sparse, rather long, black. Eyes broadly separated on vertex, black; a quadrate luteous prominence in front. Occiput small, clothed with flat black scales with a blue and green iridescence, a small golden spot at vertex; cheeks silvery white; two setæ at vertex.

Prothoracic lobes large, prominent, well separated dorsally, densely clothed with large, flat, elliptical golden scales; a row of black setæ on margin. Mesonotum densely clothed with brownish-purple scales with blue and coppery reflections; a large wedge-shaped dorsal patch of coppery golden to near middle of disk, a lunate patch on each side before root of wing of the same color, concavity of spot directed toward the wing-base. Scutellum weakly trilobate, vestiture of violet-brown scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, with a high median carina, brown, a tuft of black bristles posteriorly. Pleuræ brown, coxæ yellowish, clothed with elliptical, flat silvery-white scales in patches; a broad area along upper margin of pleuræ golden-scaled.

Abdomen short, subcylindrical, tip truncate, with many terminal pale bristles; dorsal vestiture black with a brown and submetallic blue reflection; venter silvery-scaled, the colors separated on the sides in a straight line; first segment clothed above with bronzy-brown scales with a dark-blue reflection and with numerous pale-yellow hairs.

Digitized by Google

Wings moderate, hyaline, petiole of second marginal cell two-fifths as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins rather narrow on basal portion of wing, elliptical towards tip, many obliquely subtruncate, denser and broader on apical portions of second to fourth veins.

Legs rather slender, black, with bronzy and blue reflection, femora and hind tibiæ pale golden beneath, tibiæ and tarsi with bright bronzy luster below; last hind tarsal joint silvery white beneath; mid tarsi white beneath on last three joints. Claw formula, 0.0–0.0–0–.

Length: Body about 3.5 mm.; wing 3.5 mm.

Male.—Similar to the female. Proboscis much swollen toward apex. Antennæ slender, more delicate than in the female, the joints scarcely shorter, the hairs of the whorls longer and more abundant, the ciliation coarse, scattered. Abdomen short, cylindrical, much expanded toward apex, with numerous coarse black bristles at tip. Hind legs white below to second tarsal joint, fifth joint also white beneath, as in the female; mid tarsi with the last three joints silvery white all around. Wings narrower than in the female, the stems of the fork-cells longer, the basal cross-vein closely approximated to the anterior one. Claw formula, 0.0–0.0–0.–.

Length: Body about 2.5 mm.; wing 2.8 mm.

Genitalia (plate 2, fig. 5): Side-pieces over twice as long as broad, somewhat prismatic and terminating in a sharp horn at outer angle; a prominence at base giving rise to dense, long, waved hair. Clasp-filament rather short, with a pointed branch near base; apex enlarged and divided; inner lobe broad, with a tooth on its margin and a row of setæ; outer lobe with prominences and two rows of setæ. Harpes elliptical concave, toothed at tip; harpagones small, bearing a pecten. Basal appendages with a row of five spatulate appendages.

The typical specimens were taken flying by day in a shaded cacao grove. Mr. Jennings bred others from larvæ in palm-spathes lying on the ground, but unfortunately preserved no larval skins.

East coast of Costa Rica to Panama.

Port Limon, Costa Rica, adults captured, September 28, 1905 (F. Knab); Upper Pequini River, Panama, March 30, 1909, larvæ from palm-spathe, associated with *Joblotia digitatus* (A. H. Jennings).

Limatus methysticus is not closely allied to the others in the genus, as it lacks the peculiar bent proboscis of the male and the colors of the abdomen are separated laterally in a straight line; we include it, however, as the structure of the claws of the hind tarsi agrees.

Genus WYEOMYIA Theobald.

Aëdes Williston (in part, not Meigen), Trans. Ent. Soc. Lond., 271, 1896.
Aëdes Giles (in part), Gnats or Mosq., 343, 1900.
Wyeomyia Theobald, Journ. Trop. Med., iv, 235, 1901. (Without species.)
Wyeomyia Theobald, Mon. Culic., ii, 267, 1901.
Wyëomyia Neveu-Lemaire, Mém. Soc. Zool. France, xv, 223, 1902.
Wyeomyia Giles, Gnats or Mosq., 2 ed., 495, 1902.
Wyeomyia Theobald, Mon. Culic., iii, 310, 1903.
Phoniomyia Theobald, Mon. Culic., iii, 311, 1903.
Dendromyia Theobald, Mon. Culic., iii, 313, 1903.
Aëdes Johannsen (in part), N. Y. State Mus. Bull. 68, 391, 392, 424, 1903.
Phoniomyia, *Wyeomyia*, and *Dendromyia* Lutz, in Bourroul, Mosq. do Brasil, 56-57, 1904.
Wyeomyia Felt, N. Y. State Mus. Bull. 79, 391e, 1904.
Wyeomyia Blanchard, Les Moustiques, 423, 1905.
Phoniomyia Blanchard, Les Moustiques, 425, 1905.
Dendromyia Blanchard, Les Moustiques, 426, 1905.
Phoniomyia and *Wyeomyia* Theobald, Genera Insectorum, Culic., 38, 1905.

Digitized by Google

Dendromyia Theobald, Gen. Ins., Culic., 39, 1905.
Dendromyia and *Wyeomyia* Theobald, Mosq. or Culic. Jamaica, 8, 1905.
Wyeomyia Dyar, Proc. Ent. Soc. Wash., vii, 45, 1905.
Wyeomyia Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 227, 1906.
Phoniomyia, Wyeomyia, and *Dendromyia* Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.
Phoniomyia Dyar & Knab, Proc. Biol. Soc. Wash., xix, 141, 1906.
Wyeomyia Theobald, Mon. Culic., iv, 596, 1907.
Phoniomyia Theobald, Mon. Culic., iv, 598, 1907.
Dendromyia Theobald, Mon. Culic., iv, 603, 1907.
Wyeomyia and *Phoniomyia* Dyar & Knab, Can. Ent., xxxix, 49, 1907.
Wyeomyia Howard, Osler's Modern Medicine, i, 372, 1907.
Wyeomyia and *Phoniomyia* Williston, Man. No. Am. Dipt., 3 ed., 108, 1908.
Phoniomyia, Wyeomyia, and *Dendromyia* Peryassú, Os Culicid. do Brazil, 38, 1908.
Wyeomyia, Phoniomyia and *Dendromyia* Pazos, San. y Ben., ii, 41, 1909.
Wyeomyia and *Phoniomyia* Pazos, San. y Ben., ii, 44, 1909.
Phoniomyia, Wyeomyia, Dendromyia Theobald, Mon. Culic., v, 574, 1910.
Dendromyia Coquillett, Proc. U. S. Nat. Mus., xxxvii, 531, 1910.
Phoniomyia Coquillett, Proc. U. S. Nat. Mus., xxxvii, 588, 1910.
Wyeomyia Coquillett, Proc. U. S. Nat. Mus., xxxvii, 620, 1910.

The type species are: of *Wyeomyia* Theobald, *Wyeomya grayii* Theobald; of *Phoniomyia* Theobald, *Wyeomyia longirostris* Theobald; of *Dendromyia* Theobald, *Wyeomyia luteoventralis* Theobald.

GENERIC DIAGNOSIS OF ADULT:

Proboscis short and stout or long and slender, with or without apical swelling. Palpi short in both sexes, the joints fused. Antennæ with the joints subequal, similar in the sexes; the males with small, indistinct, subapical whorls on joints. Eyes separated above the antennæ by an unusually narrow wedge-shaped or parallel-sided strip of integument. Prothoracic lobes large, well separated dorsally. Vestiture of flat, appressed scales, occiput without erect forked scales, mesonotum without setæ on the disk. Abdomen subcylindrical, the tip blunt in the female, expanded in the male. Legs long and slender, claws small, simple, equal, in the female, those of mid tarsi unequal in the male or with but a single claw.

GENERIC DIAGNOSIS OF LARVA:

Head flattened, broad, rounded, the antennæ small; mouth-brushes thick but short; air-tube moderate or long, never very short, with scattered hairs or tufts and sometimes pecten of a few spines; a comb of usually separate scales on sides of eighth segment. Anal segment with a dorsal plate, long-haired dorsal and lateral tufts, and usually short subventral pair; anal gills moderate, one pair sometimes more or less aborted.

Most of the species inhabit the tropical parts of the American continent, one reaching into temperate and subboreal latitudes; a few species have been recognized from the tropics of the Old World, but these we have not seen.

Phoniomyia was defined on the character of the long, slender proboscis; but we have found such great variation in the condition of this organ in the different species of *Wyeomyia* that it is impossible to draw any dividing line. *Dendromyia* was defined on the character of the scales of the wings, which we find to be untenable. Theobald places *Heizmannia* Ludlow, from the Philippines, as a synonym of *Dendromyia,* but wrongly, as we have satisfied ourselves by examining the type. Coquillett indicated *Dendromyia ulocoma* Theobald as the type of *Dendromyia,* but Blanchard, five years earlier, had already fixed the type as *Wyeomyia luteoventralis* Theobald. The strip of integument between the eyes varies in shape in the different species, but in no case are the eyes actually contiguous on the face, in the manner of *Sabethes.* The colorational characters which we have used in the separation of the species are, we believe, as reliable and constant as any such characters usually are, much more so than they are in the more highly developed culicine genera such as *Culex.* They are, however, small and difficult to see, so that considerable experience is required before one can use them successfully. The color of the prothoracic lobes, the markings on the occiput and those on the feet are important, but so difficult of

Digitized by Google

observation that they are omitted in all the early descriptions. We have consequently been unable to place the species described by Theobald from South America; but this proves to be of less importance, since it is probable that the majority of them are different species from any of ours. The species of *Wyeomyia* are largely local and but few species possess an extended range. The markings on the feet are usually on one side only and repeated observations are required from many points of view before concluding that there is no white marking present. The distribution of white on the feet is not infrequently different in the two sexes. South American authors have concluded that these characters are variable and have consequently recognized but few species. We think this to be a wrong view and that careful study will reveal a large fauna in the American tropics.

The different species of this large genus exhibit considerable diversity in the form of the scales on the wing-veins. Mr. Theobald has used this to divide the genus *Wyeomyia*, his description of *Dendromyia* indicating that it was characterized by broadly ovate scales with subtruncate apices. His original conception of *Wyeomyia* was intended to include all the species with setæ and without scales upon the postnotum (Mon. Culicid., ii, 271, sixth paragraph); but before the work appeared he discovered that setæ were also present on the postnotum of *Sabethes* (Mon. Culic., i, 97, footnote), so that he adds "The species described here as *Wyeomyias* very closely resemble ♀ *Sabethes*, but the wing scales are never asymmetrical as in that genus" (Mon. Culic., ii, 268, note). Later he restricted *Wyeomyia* to "wings with the veins with narrowish lateral vein scales" (Mon. Culic., iii, 310), and described *Dendromyia* "the wings have long, broad, dense *Taeniorhynchus*-like scales, some ending asymmetrically" (Mon. Culic., iii, 313). We take the type of *Wyeomyia* to be *grayii* Theobald; that of *Dendromyia* is *Wyeomyia luteoventralis* Theobald, according to indication of Blanchard. Unfortunately Theobald's conception of what constituted a "broad" or "narrow" scale has undergone considerable modification during the course of his studies. His original figure of *Wyeomyia grayii* (Mon. Culic., ii, 270, fig. i) shows a typically narrow scale; likewise his figure of *Dendromyia ulocoma*, the first species described in the new genus, may be conceded to represent a broad scale (Mon. Culic., iii, 314, fig. 175). But his figures of *Dendromyia luteoventralis* (Mon. Culic., iii, 318, fig. 177), *Dendromyia mitchellii*, *Dendromyia smithii*, and *Dendromyia oblita* (Mon. Culic., iv, pp. 606, 607, 608, 609, and 612) can in no sense be said to represent broad scales, being entirely typical of his original conception of *Wyeomyia*. This should be kept in mind in any attempt to identify Theobald's descriptions. As a matter of fact, the species of *Wyeomyia* do not divide sharply on the character of the wing-scales, all sorts of intergrades existing, not only in the several species, but also on the wings of the same species, so that it is necessary to specify accurately the particular area of the wing under observation; this, even admitting that these scales are of generic value, which we deny. The scales can be used in the separation of otherwise closely similar species, and we so use them in the following. Any attempt, however, to divide the genus upon this character must fail.

While we have not found that the species can be associated into groups upon the scale characters, nor upon markings and coloration, yet upon the characters of the male genitalia and the larvæ several distinct groups appear. These are correlated with the habits. Unfortunately the early stages of many of the species are unknown to us, and of others we possess no males; but as far as the present material goes, very distinct groups are indicated. The largest group is the one inhabiting the bromelias, or rather there are two groups in these

Digitized by Google

plants. One is typified by *W. mitchellii*, the adults possessing male genitalia of that type, while the larvæ agree with the type of that larva. The larvæ do not segregate further, but upon the genitalia three subgroups appear, namely, besides the *mitchellii* group, one typified by *W. vanduzeei*, and probably containing all the species with silvery prothoracic lobes, the other typified by *W. chrysomus*. To this last subgroup belongs the subboreal *W. smithii* inhabiting *Sarracenia*. The third bromelia group is uniform in the larva, typified by *W. circumcincta*, but shows two markedly different types of genitalia. The aberrant type is typified by *W. trinidadensis*, and probably includes all of the species with silvery scutellum. The next distinct group consists of those species inhabiting *Heliconia, Calathea,* and *Calladium,* and perhaps other plants holding water in the flower-bracts or leaf-axils. The group is typified by *W. cacodela*. The *Calladium* species, inhabiting the leaf-axils, form almost a distinct group from the flower-bract species, especially the larvæ being entirely dissimilar. This subgroup, or group, is typified by *W. pandora*. The last group is that inhabiting tree-holes, bamboo-joints, etc. This may be typified by *W. symmachus*. The larvæ, as far as we know them, are uniform, but the genitalia indicate two subgroups, typified, besides the *symmachus* group, by *W. bromeliarum*. Finally, there remains the group typified by *W. aporonoma*, with a unique type of genitalia, allied to those of the *mitchellii* group, and with larvæ indistinguishable from that group, but living in cocoanut-husks, etc. We know so little of this group that it is difficult to be sure of its proper position. It comprises, besides *apronoma*, only *hemisagnosta*, of which we have no genitalia.

Among the members of this large genus it is probable that considerable diversity exists in habits and life histories, but of most of them we know nothing. As to what fragments of information we do possess, however, they indicate a general similarity with the one species which inhabits temperate latitudes and is on that account better known. This species lives in the water in the leaves of the pitcher-plant, which grows in swampy localities. The eggs are deposited in the young leaves, singly, attached to the leaf-surface within before any water has accumulated. They hatch after the leaf has been filled by rain-water and the larvæ grow slowly, feeding upon the insect remains and other detritus that accumulate in the leaf. The larvæ pass the winter frozen up in the cores of ice that form in the leaves and finish their development in the spring, when, after pupation, the adults emerge. This species is not known to bite and the adults probably frequent the immediate vicinity of the marshes. We have no observations on their habits, as the species is practically never seen unless bred. In the case of the tropical species there is no necessity for a period of hibernation, but the dry season, when the water disappears from the leaves, is in all probability passed in the egg state. It may, of course, be passed in the adult state; we have no definite information on the matter, but the former seems to us the more probable. In two cases Mr. Busck has found the eggs in numbers in the newly opened flower-spathes of *Heliconia*, where as yet no water was present. Some of the tropical species inhabit the water between the leaves of Bromeliaceæ, others in other plants carrying water in the leaves, such as *Calladium*, etc., or in flowers, in some of which the liquid is apparently largely secreted by the plant itself (*Heliconia, Calathea*); others in water in hollow trees, bamboo-joints, cocoanut-husks, etc. The species are different in the case of the several plants that have different characteristics, while the tree-hole species form another group. No species inhabit open water or earth pools. The development is usually rather slow, and even the pupal period is rather long. Many, if not all, of the tropical species as adults are diurnal in habit and the females, at least of some of the species, will suck blood. They inhabit forested regions, where their breeding-places occur.

Digitized by Google

Tables of the Species.

ADULTS, STRUCTURE AND COLORATION.

1. Scutellum silvery 2
   Scutellum not silvery 3
2. Mid tarsi without any white; prothoracic lobes coppery golden
   homotina Dyar & Knab (p. 58)
   Mid tarsi with white markings; prothoracic lobes violet-blue
   trinidadensis Theobald (p. 59)
3. Prothoracic lobes entirely silvery white..... 4
   Prothoracic lobes golden, or golden tipped..... 9
   Prothoracic lobes shining violet or blue..... 11
   Prothoracic lobes darkly colored, similar to the mesonotum..... 24
4. Abdomen silvery-tipped above..... 5
   Abdomen without silvery tip..... 8
5. Female with the hind tarsi only marked with white. *minor* Dyar & Knab (p. 62)
   Female with the mid and hind tarsi marked with white..... 6
   Female with all the tarsi marked with white..... 7
6. White on the mid tarsi indistinct, on the tip of the second joint and on last three ..... *bahama* Dyar & Knab (p. 62)
   White on the mid tarsi distinct, on third and fourth joints
   conchita Dyar & Knab (p. 63)
7. White reflection on the under side of fore tarsi confined to the last three joints
   argyrura Dyar & Knab (p. 64)
   This color continuous on all the joints..... *vanduzeei* Dyar & Knab (p. 65)
8. Basal cross-vein less than its length from the anterior cross-vein
   fratercula Dyar & Knab (p. 68)
   Basal cross-vein distant its own length from the anterior cross-vein
   sororcula Dyar & Knab (p. 69)
9. Proboscis long and slender..... *chrysomus* Dyar & Knab (p. 70)
   Proboscis short and stout..... 10
10. Mid tarsi marked with white in the female, hind tarsi dark; male unknown
    agnostips Dyar & Knab (p. 72)
    Mid tarsi not marked with white in the female, hind tarsi white-marked; male the same..... *aporonoma* Dyar & Knab (p. 73)
11. Eyes with a continuous, narrow, white-scaled margin behind..... 12
    Eyes without a continuous white margin..... 14
12. Mid and hind tarsi marked with white in the female; male the same
    guatemala Dyar & Knab (p. 75)
    Mid tarsi marked with white, hind tarsi dark; male the same..... 13
13. White on mid tarsi on tip of the second and all of third and fourth joints
    abascanta Dyar & Knab (p. 78)
    White on mid tarsi on apical half of second and all of third to fifth joints
    megalodora Dyar & Knab (p. 77)
14. Occiput with a silvery-white spot on the vertex..... 15
    Occiput without a silvery spot on the vertex..... 20
15. Mid and hind tarsi marked with white in the female..... 16
    Mid tarsi only marked with white on the female..... 17
16. Prothoracic lobes pale violet; white marks on the hind tarsi broad
    violescens Dyar & Knab (p. 79)
    Prothoracic lobes dark violet; white marks on the hind tarsi small
    mitchellii Theobald (p. 80)
17. Proboscis moderate; prothoracic lobes violet or blue-violet..... 18
    Proboscis very long; prothoracic lobes pale blue
    philophone Dyar & Knab (p. 85)
18. Prothoracic lobes violaceous; a white margin on the lower half of eye
    antoinetta Dyar & Knab (p. 83)
    Prothoracic lobes blue-violet..... 19
19. White margin behind eye on less than the lower half.. *smithii* Coquillett (p. 94)
    White margin behind eye reaching above the lower half
    matæa Dyar & Knab (p. 93)
20. The white on the last two hind tarsal joints continuous..... 21
    The white on these joints interrupted..... 23
21. The white on the hind tarsi complete around the joint
    pandora Dyar & Knab (p. 87)
    The white on the hind tarsi on one side only..... 22
22. The apical two-thirds of second joint of the mid tarsi white
    canfieldi Dyar & Knab (p. 89)

Digitized by Google

The apical third of the second joint of the mid tarsi white
melanocephala Dyar & Knab (p. 86)
23. Wing-scales broad, obliquely subtruncate..... *clasoleuca* Dyar & Knab (p. 92)
Wing-scales narrow, ligulate.....*homothe* Dyar & Knab (p. 91)
24. Abdomen with the white on the sides deeply incised
codiocampa Dyar & Knab (p. 101)
Abdomen with the colors separated on the sides in a straight line..... 25
25. Prothoracic lobes with a distinct white tip..... 26
Prothoracic lobes without white tip, or only indistinctly pale-scaled..... 32
26. Eyes with a white-scaled margin..... 27
Eyes without a white margin..... 31
27. Female with mid and hind tarsi marked with white; male the same..... 28
Female with the hind tarsi marked with white, the mid tarsi dark; male unknown ..... *gynaecopus* Dyar & Knab (p. 107)
Female with the tarsi not marked with white..... 29
28. White less extensive; mid legs with no white on second tarsal
labesba Howard, Dyar & Knab (p. 106)
White more extensive; mid legs with apex of second tarsal white
ablabes Dyar & Knab (p. 104)
29. Palpi silvery tipped in the female; all white in the male..... 30
Palpi entirely bronzy black..... *abebela* Dyar & Knab (p. 111)
30. Wing-scales on the forks of the second vein long, ligulate
espartana Dyar & Knab (p. 108)
Wing-scales on the forks of the second vein short. *drapetes* Dyar & Knab (p. 109)
31. Mid and hind tarsi marked with white in the female; male unknown
hosautus Dyar & Knab (p. 112)
Mid tarsi only marked with white; male the same.. *abia* Dyar & Knab (p. 113)
Tarsi not marked with white in the female; male unknown
panamena Dyar & Knab (p. 115)
32. Eyes with a narrow white border or vertical spot..... 33
Eyes without a white border or vertical spot..... 49
33. A median pale stripe on occiput..... 34
No median pale stripe on occiput..... 37
34. The stripe on occiput broad, white..... 35
The stripe on occiput diffused, iridescent..... 36
35. Wing-scales long, narrowly ovate.....*autocratica* Dyar & Knab (p. 116)
Wing-scales broadly ovate, obliquely subtruncate... *cara* Dyar & Knab (p. 118)
36. White of hind tarsi continuous on the fourth and fifth joints
{*eloisa* Howard, Dyar & Knab (p. 121)
{*pseudopecten* Dyar & Knab (p. 119)
{*pantoia* Dyar & Knab (p. 123)
White of hind tarsi interrupted at tip of fourth joint
onidus Dyar & Knab (p. 125)
37. The white border of the eyes uniform..... 38
The white border of the eyes constricted or interrupted subdorsally..... 43
38. Mid and hind tarsi marked with white in the female; male unknown
adelpha Dyar & Knab (p. 126)
Tarsi all dark in the female..... 39
39. Prothoracic lobes unicolorous, dark; hind tarsi only of the male marked with white 40
Prothoracic lobes black above, white below..... 41
40. Hind tarsi of the male yellowish silvery white below throughout, with the tibiæ ..... *galoa* Dyar & Knab (p. 127)
Hind tarsi of the male with the third to fifth joints silvery below
cacodela Dyar & Knab (p. 129)
41. Wing-scales very broad..... *agyrtes* Dyar & Knab (p. 133)
Wing-scales narrowly ovate..... 42
42. With white scales on the anterior edge of the mesonotum; male the same
bromeliarum Dyar & Knab (p. 131)
Without such scales; male unknown..... *pertinans* Williston (p. 134)
43. Mid tarsi marked with white in the female, hind tarsi dark..... 44
Mid and hind tarsi marked with white in the female..... 45
Mid tarsi dark in the female, hind tarsi white-marked below..... 48
44. Mid tarsi with the fifth joint dark; proboscis whitish below
telestica Dyar & Knab (p. 137)
Mid tarsi with the fifth joint white-marked; proboscis dark below
glaucocephala Dyar & Knab (p. 136)

Digitized by Google

45. Scales on the forks of the second vein alike throughout, uniform..... 46
These scales unlike, those on the basal half narrow, ligulate, those on the apical half broad and short..... 47
46. Scales on the forks of the second vein short, broad, obliquely subtruncate *symmachus* Dyar & Knab (p. 142)
These scales long, narrow, ovate..... *chalcocephala* Dyar & Knab (p. 145)
47. Mid tarsi of the female with the tip of the second, the third and fourth joints white below ..... *chresta* Dyar & Knab (p. 139)
Mid tarsi of the female with the fourth joint white below; male with the third and fourth joints white below..... *abrachys* Dyar & Knab (p. 141)
48. Hind tarsi in both sexes with basal two-thirds of fourth and fifth joints white beneath, a small white spot at base of third joint *simmsi* Dyar & Knab (p. 146)
Male with all the joints of the hind tarsi white-marked at base below (female unknown) ..... *leucopisthepus* Dyar & Knab (p. 148)
49. Proboscis short and stout..... 50
Proboscis long and slender..... 53
50. Mid and hind tarsi white-marked in the female *phroso* Howard, Dyar & Knab (p. 149)
Last two hind tarsal joints only white-marked in the female..... 51
Hind feet all dark in the female, all the tarsi dark; male with the front and mid legs white-marked..... 52
51. White of the hind tarsi interrupted at the apex of the fourth joint in the female; male unknown..... *baria* Dyar & Knab (p. 154)
White of the hind tarsi continuous in the female. *pantoia* Dyar & Knab (p. 123)
52. Mid tarsi of male encircled by white..... *circumcincta* Dyar & Knab (p. 150)
Mid tarsi, bright brassy, almost white beneath *cœnonus* Howard, Dyar & Knab (p. 153)
53. Mid tarsi of the female marked with white..... 54
Mid tarsi of the female entirely dark..... *scotinomus* Dyar & Knab (p. 157)
54. Mid tarsi white beneath at apex of second and all of third and fourth joints; hind tarsi dark; male unknown..... *celænocephala* Dyar & Knab (p. 155)
Mid tarsi with the fourth joint white beneath; hind tarsi with base of second and third and all but the tips of fourth and fifth joints white beneath; male unknown .....*hapla* Dyar & Knab (p. 156)

The following species are not included: *Wyeomyia grayii* Theobald, of which the description is insufficient and the type in poor condition, and *Wyeomyia hemisagnosta* Dyar & Knab, of which the larva only is known.

MALE GENITALIA (LIMATUS, WYEOMYIA, AND SABETHINUS).

1. Side-pieces short with broad tips excavated for the insertion of the clasp-filament ..... { *L. durhamii* Theobald (p. 44) / *L. cacophrades* Dyar & Knab (p. 47) }
Side-pieces not so constructed..... 2
2. Clasp-filament with four lobes, the basal one long, slender and simple, the inner lobe broad with a row of spines.. { *S. undosus* Coquillett (p. 34) / *S. identicus* Dyar & Knab (p. 36) }
Clasp-filament not so constructed..... 3
3. Clasp-filament greatly reduced, the side-pieces produced at the outer angle.. 4
Clasp-filament somewhat reduced, supplemented by a long basal lobe bearing an appendage 6
Clasp-filament well developed without additional structure..... 8
4. Outer angle of side-piece produced into a long arcuate process longer than the basal portion 5
Outer angle of side-piece shortly produced with thick spines *W. autocratica* Dyar & Knab (p. 117)
5. Outer production of side-piece curved...*W. circumcincta* Dyar & Knab (p. 152)
Outer production of side-piece straight *W. cœnonus* Howard, Dyar & Knab (p. 154)
6. Lobe from base of side-piece bearing two long coarse hairs..... 7
Lobe from side-piece bearing an angled expanded filament { *W. cacodela* Dyar & Knab (p. 130) / *W. onidus* Dyar & Knab (p. 126) / *W. pantoia* Dyar & Knab (p. 124) }
7. This lobe near base; hairs long..... *W. pseudopecten* Dyar & Knab (p. 120)
This lobe subapical; hairs shorter.... *W. eloisa* Howard, Dyar & Knab (p. 122)

Digitized by Google

8. Clasp-filament divided into three long filamentous lobes, one of which arises close to the base..... *W. trinidadensis* Theobald (p. 61)
Clasp-filament slender with slender, attenuated branches, arising from the tip of the slenderly prolonged side-piece
W. aporonoma Dyar & Knab (p. 74)
Clasp-filament of three lobes, one of which is broad and setose; side-piece not attenuated at tip..... 9

9. Harpes crested by a tufted filament; lateral angles of the penultimate segment strongly produced..... 10
Harpes without crests; lateral angles of penultimate segment somewhat or not produced..... 11

10. Crest of harpes a fine tuft of hairs..... *W. codiocampa* Dyar & Knab (p. 103)
Crest of harpes a row of coarse lamellæ.. *W. symmachus* Dyar & Knab (p. 144)

11. Side-piece with a lobe at base bearing long waved hair
L. methysticus Dyar & Knab (p. 49)
Side-piece without such a lobe, with three long hairs..... 12

12. Inner lobe of clasp-filament rounded elliptical, with a row of fine erect hairs. 13
Inner lobe of clasp-filament not so formed..... 14

13. Outer lobe of clasp-filament crested; inner lobe of side-piece not exceeding ends of harpes..... *W. bromeliarum* Dyar & Knab (p. 132)
Outer lobe of clasp-filament hooked; inner lobe of side-piece reaching the apex ..... { *W. espartana* Dyar & Knab (p. 109) / *W. drapetes* Dyar & Knab (p. 110)

14. Middle lobe of the clasp-filament conical pointed or furcate..... 15
Middle lobe of clasp-filament broad with truncate apex..... 22

15. One lateral lobe of clasp-filament slender, the other broad..... 16
Both lateral lobes of clasp-filament slender or small..... 19

16. Harpes broad, pointed at tip with a few setæ. *W. vanduzeei* Dyar & Knab (p. 66)
Harpes slender, bent and dentate at tip..... 17

17. Stem of clasp-filament short and stout.....*W. matæa* Dyar & Knab (p. 94)
Stem of clasp-filament long and slender..... 18

18. Clasp-filament with only one broad lobe. *W. chalcocephala* Dyar & Knab (p. 146)
Clasp-filament with two broad lobes..... *W. galoa* Dyar & Knab (p. 128)

19. Clasp-filament with round, sucker-like disks.. *W. abebela* Dyar & Knab (p. 112)
Clasp-filament without such structures..... 20

20. Middle lobe of clasp-filament short and broad. *W. pandora* Dyar & Knab (p. 88)
Middle lobe of clasp-filament long and conical..... 21

21. Outer lobe smooth; middle lobe crested.... *W. philophone* Dyar & Knab (p. 86)
Outer lobe with a spine; middle lobe spiny..... *W. smithii* Coquillett (p. 96)
Outer lobe with several spines; middle lobe setose
W. chrysomus Dyar & Knab (p. 71)

22. Harpes tipped by two filaments..... *W. abascanta* Dyar & Knab (p. 79)
Harpes simply pointed at tip..... 23

23. Inner and outer lobes of clasp-filament both sharply pointed..... 24
One side-lobe of clasp-filament broad or truncate..... 26

24. Middle lobe of clasp-filament with thickened, lined center
W. ablabes Dyar & Knab (p. 105)
Clasp-filament without this structure..... 25

25. Outer lobe of clasp-filament long, flexuous, detached
W. abrachys Dyar & Knab (p. 142)
Outer lobe of clasp-filament short, angled, spine-like
W. simmsi Dyar & Knab (p. 147)

26. The broad side-lobe elliptical or subtriangular, forming a lappet opposed to the broad central lobe..... 27
The broad side lobe shortly truncate forming an angle on the margin of the broad central lobe..... 28

27. Lappet-lobe of clasp-filament dentate and tubercular
W. telestica Dyar & Knab (p. 138)
Lappet-lobe of clasp-filament elliptical, smooth
{ *W. mitchellii* Theobald (p. 82) / *W. antoinetta* Dyar & Knab (p. 84)

28. Clasp-filament with median and marginal rib on middle lobe
W. scotinomus Dyar & Knab (p. 159)
Clasp-filament with small detached pointed lobe
{ *W. chresta* Dyar & Knab (p. 140) / *W. leucopisthepus* Dyar & Knab (p. 149)

Digitized by Google

The following species of *Wyeomyia* are omitted, as we possess no male specimens:

homotina D. & K.
minor D. & K.
bahama D. & K.
conchita D. & K.
argyrura D. & K.
fratercula D. & K.
sororcula D. & K.
agnostips D. & K.
guatemala D. & K.
megalodora D. & K.
violescens D. & K.
melanocephala D. & K.
canfieldi D. & K.
homothe D. & K.
ciasoleuca D. & K.
labesba How., D. & K.
gynæcopus D. & K.
hosautus D. & K.
abia D. & K.
panamena D. & K.
cara D. & K.
adelpha D. & K.
agyrtes D. & K.
pertinans Will.
grayii Theob.
glaucocephala D. & K.
phroso How., D. & K.
baria D. & K.
celænocephala D. & K.
hapla D. & K.
hemisagnosta D. & K.

LARVÆ (LIMATUS AND WYEOMYIA).

1. Air-tube with a dense fringe of long hairs on posterior margin
   { *W. canfieldi* Dyar & Knab (p. 90)
   { *W. pandora* Dyar & Knab (p. 89)
   Air-tube without dense posterior fringe 2
2. Air-tube attenuated from near base 3
   Air-tube conically tapered or subfusiform 6
3. Air-tube with false pecten of spine-like hairs 4
   Air-tube without false pecten ..... *W. abebela* Dyar & Knab (p. 112)
4. Both pairs of dorsal head-hairs in fives .. *W. circumcincta* Dyar & Knab (p. 152)
   Upper pair in twos or threes, lower multiple 5
5. A double hair behind lateral comb ..... *W. autocratica* Dyar & Knab (p. 117)
   A quadruple hair behind lateral comb ..... *W. trinidadensis* Theobald (p. 61)
6. Air-tube with a false pecten 7
   Air-tube without false pecten 9
7. False pecten of several teeth beyond the middle of the tube
   W. chalcocephala Dyar & Knab (p. 146)
   False pecten of two to four teeth before the middle of the tube 8
8. Comb-scales in an irregular double row; lateral abdominal hairs in part multiple ..... *W. cacodela* Dyar & Knab (p. 130)
   Comb-scales in a patch three rows deep; lateral abdominal hairs in twos
   { *W. pantoia* Dyar & Knab (p. 124)
   { *W. eloisa* Howard, Dyar & Knab (p. 122)
   { *W. pseudopecten* Dyar & Knab (p. 120)
   { *W. onidus* Dyar & Knab (p. 126)
9. A chitinous plate present with the lateral comb of the eighth segment 10
   No such plate present 12
10. Comb-scales detached from the plate or nearly so
   W. bromeliarum Dyar & Knab (p. 132)
   Comb-scales situated on the plate 11
11. Air-tube long, eight times as long as wide. *W. symmachus* Dyar & Knab (p. 144)
   Air-tube shorter, four times as long as wide
   W. codiocampa Dyar & Knab (p. 103)
12. Comb-scales in a patch 13
   Comb-scales in a single row 14
13. Tube and plate with black basal ring ..... *W. aporonoma* Dyar & Knab (p. 74)
   Tube and plate without black basal ring. *W. hemisagnosta* Dyar & Knab (p. 159)
14. Comb of four well-separated scales ..... *L. durhamii* Theobald (p. 45)
   Comb of about six scales ..... *L. cacophrades* Dyar & Knab (p. 47)
   Comb of about ten to twelve scales 15
   Comb of numerous scales in a long line running well toward ventral side ... 16
15. Head-hairs single; anal gills only two ..... *W. smithii* Coquillett (p. 96)
   Head-hairs double; anal gills four ..... *W. chresta* Dyar & Knab (p. 140)
16. Lateral tuft of anal plate double 17
   Lateral tuft of anal plate single 19
17. Air-tube with a row of small tufts on dorsal aspect 18
   Air-tube with well-distributed single hairs
   { *W. scotinomus* Dyar & Knab (p. 159)
   { *W. ablabes* Dyar & Knab (p. 105)

Digitized by Google

18. Subventral tuft of anal segment short, multiple ... *W. sororcula* Dyar & Knab (p. 69)
Subventral tuft of anal segment long, triple. *W. vanduzeei* Dyar & Knab (p. 67)
19. Tufts of the air-tube mostly in twos ... *W. simmsi* Dyar & Knab (p. 147)
Tufts of the air-tube mostly single ... 20
20. Air-tube with a double or triple tuft near the base ... 21
All basal hairs of the tube single ... 22
21. Lateral abdominal hairs single ... *W. philophone* Dyar & Knab (p. 86)
Lateral abdominal hairs double ... *W. telestica* Dyar & Knab (p. 137); *W. labesba* Howard, Dyar & Knab (p. 106)
22. Lower head-hairs single ... 23
Lower head-hairs double ... 24
23. Ante-antennal head-hairs in threes ... *W. abrachys* Dyar & Knab (p. 142)
Ante-antennal head-hairs in fours ... *W. hapla* Dyar & Knab (p. 157)
24. Upper head-hairs double ... *W. abia* Dyar & Knab (p. 115)
Upper head-hairs in fours ... *W. mitchellii* Theobald (p. 82); *W. antoinetta* Dyar & Knab (p. 84)

The larvæ of the following species are unknown:

L. methysticus D. & K.
W. homotina D. & K.
W. minor D. & K.
W. bahama D. & K.
W. conchita D. & K.
W. argyrura D. & K.
W. fratercula D. & K.
W. chrysomus D. & K.
W. agnostips D. & K.
W. guatemala D. & K.
W. megalodora D. & K.
W. abascanta D. & K.
W. violescens D. & K.
W. melanocephala D. & K.
W. homothe D. & K.
W. clasoleuca D. & K.
W. matæa D. & K.
W. gynæcopus D. & K.
W. espartana D. & K.
W. drapetes D. & K.
W. hosautus D. & K.
W. panamena D. & K.
W. cara D. & K.
W. adelpha D. & K.
W. galoa D. & K.
W. agyrtes D. & K.
W. pertinans Will.
W. grayii Theob.
W. glaucocephala D. & K.
W. leucopisthepus D. & K.
W. phroso How., D. & K.
W. cænonus How., D. & K.
W. baria D. & K.
W. celænocephala D. & K.

WYEOMYIA HOMOTINA (Dyar & Knab).

Phoniomyia homotina Dyar & Knab, Proc. biol. Soc. Wash., xix, 141, 1906.
Phoniomyia (?) *homotina* Theobald, Mon. Culic., v, 623, 1910.

ORIGINAL DESCRIPTION OF PHONIOMYIA HOMOTINA.

Tarsi without any white; abdomen and legs blackish with a dark blue sub-metallic reflection. A large species like *P. magna* Theobald, but differing therefrom in the color of the body and legs.

5 specimens, Port Limon, Costa Rica (F. Knab); Trece Aguas, Alta Vera Paz, Guatemala, March and April (Schwarz and Barber).

Type.—Cat. No. 9993, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF WYEOMYIA HOMOTINA (MALE AND LARVA UNKNOWN):

Female.—Proboscis long and slender, uniform; labellæ conically tapered, with fine outstanding setæ; vestiture black. Palpi small, one-eighth as long as proboscis, clothed with black scales and rather long, fine setæ. Clypeus rounded triangular, dark brown, shining. Antennæ moderate, the joints subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, slightly pruinose; hairs of whorls sparse, rather long, black. Eyes black. Occiput broad, clothed with flat, appressed scales, black with blue-green reflection, a large vertical patch, silvery white in some lights, dark gray in others, a silvery patch at the sides below.

Prothoracic lobes well separated dorsally, brown, clothed with dark-brown scales, with a golden reflection; a row of setæ along margin. Mesonotum black, clothed with long, narrow, curved dark-brown scales, the bristles over roots of wings short, pale. Scutellum trilobate, clothed with broad, flat silver scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, blackish, a tuft of small setæ posteriorly. Pleuræ black, coxæ pale brown, clothed with elliptical silvery white scales.

Abdomen subcylindrical, blunt at tip, with small brown terminal setæ; dorsal vestiture black, with a submetallic blue reflection; venter yellowish silvery-white, the colors separated on the sides in a straight line.

Digitized by Google

Wings moderate, hyaline, tinged with smoky along edges of nervures; petiole of second marginal cell slightly shorter than its cell, that of second posterior cell as long as its cell; basal cross-vein distant less than its own length from the anterior cross-vein; scales of veins narrowly elliptical, brown, with a blue reflection, those on forks of second vein and apex of third vein broad and denser. Halteres largely blackish.

Legs slender, black, with a bronzy and blue reflection, trochanters silvery white-scaled; femora pale bronzy beneath except at their apices; base of the first tarsal joint of the hind legs with short ciliation. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

The adults were taken in the daytime, flying in the forest.

Eastern coast of Central America. Cacao, Trece Aguas, Alta Vera Paz, Guatemala, March 25, 27, April 15, 1906 (Schwarz and Barber); Bluefields, Nicaragua (W. F. Thornton); Port Limon, Costa Rica, September 28, 1905 (F. Knab).

Wyeomyia homotina is allied to *W. trinidadensis*, but is specifically distinct. It is an illustration of the diversity of the faunas of Central America and Trinidad, the latter possessing a fauna essentially Brazilian, the former having a more endemic one.

WYEOMYIA TRINIDADENSIS Theobald.

Wyeomyia trinidadensis Theobald, Mon. Culic., ii, 277, 1901.
Wyeomyia trinidadensis Giles, Gnats or Mosq., 2 ed., 497, 1902.
Phoniomyia longirostris Theobald (in part not Theobald), Mon. Culic., iii, 311, 1903.
Phoniomyia longirostris Blanchard (in part), Les Moustiques, 425, 1905.
Wyeomyia longirostris Dyar & Knab (not Theobald), Journ. N Y. Ent. Soc., xiv, 229, 1906.
Phoniomyia longirostris Coquillett (not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 27, 1906.
Phoniomyia trinidadensis Dyar & Knab, Proc. Biol. Soc. Wash., xix, 141, 1906.
Phoniomyia longirostris Theobald (in part not Theobald), Mon. Culic., v, 576, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA TRINIDADENSIS:

Thorax deep brown, with bronzy scales. Abdomen black, with metallic green reflections, basal white lateral spots, which often pass into basal bands, venter white scaled. Legs long, black, the mid tarsi white above. Ungues small, equal, simple. Proboscis as long or longer than the whole insect.

♀. Head covered with flat brown scales with metallic violet and sometimes green reflections, sides with rather grey scales; around the eyes are short black bristles projecting over them; eyes black and coppery, two long pale brown bristles project from the head between them; antennæ rather short, black, basal joints with a grey sheen, almost white in some lights; palpi very short, covered with purplish-brown scales; clypeus brown, with grey sheen; proboscis thin, very long, as long or longer than the whole insect, deep brown with metallic reflection.

Thorax deep brown, with flat spindle-shaped bronzy-green scales, which appear deep bronzy in some lights; numerous deep brown and golden-brown bristles over the roots of the wings; prothoracic lobes covered with flat scales, showing blue, violet and ochraceous reflections, and a few forwardly projecting bristles; scutellum densely clothed with flat bronzy scales, black when denuded; mid lobe with four border-bristles, the two median ones crossing one another; metanotum nearly black, with apparently three bristles in a row behind and two in front; pleuræ brown, densely clothed with flat white scales.

Abdomen black, clothed with rather large flat black scales, which are more or less metallic in reflected light, deep black in other lights; at the base of each segment is a silvery-white scaled lateral spot, which on the last two segments form more or less complete white basal bands; apical segment with black bristles; first segment brown, with grey scaled sides; posterior border-bristles very short; venter densely clothed with silvery-white scales.

Legs with pallid ochraceous coxæ, and covered with white scales, remainder covered with deep blackish scales with metallic purple and bronze reflections; femora white scaled beneath; hind metatarsi about one-third longer than the tibiæ; ungues equal and simple, very small; tibiæ spiny; the first, second and third tarsi of the mid legs are white scaled on one side.

Digitized by Google

Wings with brown scaled veins, blackish along the costa and towards the roots, the base being ochraceous-yellow; the lateral scales are long and thin, the median small, rather thick; first sub-marginal cell longer and narrower than second posterior cell, its stem not quite half the length of the cell, its base a little nearer the base of the wing than that of the second posterior cell; stem of the latter longer that the stem of first sub-marginal cell, equal to about two-thirds of the length of the cell; posterior cross-vein a little longer than the mid cross-vein, distant from the latter about its own length.

Halteres with bright, brown stem and fuscous knob.

Length.—2.8 mm.; with proboscis 4.5.

Habitat.—Trinidad (Urich).

Time of capture.—November and December.

Observations.—Described from a good series of ♀'s sent by Mr. Urich. It can at once be told from all other *Wyeomyias* by the abdomen having silvery-white lateral spots, which form bands apically, and by its black scaly appearance, the white abdominal bands being very clear and also the white on the tarsi. Some specimens show more abdominal bandings than others. I think the white on the mid tarsi is entirely dorsal. The proboscis is very long. They are found in cocoa groves bordering the forests, and in the forest amongst the second growth, and do not enter houses.

DESCRIPTION OF FEMALE, MALE AND LARVA OF WYEOMYIA TRINIDADENSIS:

Female.—Proboscis very long and slender, uniform, labellæ conically tapered, with fine outstanding setæ; vestiture black, with bronzy luster. Palpi small, one-eighth as long as proboscis, clothed with bronzy black scales and rather long, fine setæ. Clypeus rounded triangular, brown, shining. Antennæ moderate, the joints subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, slightly pruinose; hairs of whorls sparse, long, black. Eyes black. Occiput broad, clothed with flat, appressed scales, black, with metallic reflection, a vertical violaceous patch, silvery in some lights; a silvery-white patch at the sides below.

Prothoracic lobes well separated dorsally, brown, clothed with pale violaceous scales, base silver-scaled, with a row of setæ on anterior margin. Mesonotum black, clothed with narrow, elliptical, dark-brown scales with bronzy reflection, almost silvery in some lights, bristles over roots of wings short, pale. Scutellum trilobate, clothed with elliptical, flat silvery scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, a tuft of small setæ posteriorly. Pleuræ brown, coxæ luteous, clothed with elliptical silvery-white scales.

Abdomen subcylindrical, the tip blunt, with brown terminal setæ; dorsal vestiture black, a few silvery-white scales forming bands at bases of last four segments; first abdominal segment black, with silvery luster in some lights, a silver patch at the sides; venter yellowish silvery-white, the colors separated on the sides in an extremely angular line incised at the base of each segment; scales roughened along medioventral line.

Wings moderate, hyaline; petiole of second marginal cell half as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins spatulate, black, with bronzy reflection, broader and denser on forks of second vein. Halteres largely blackish.

Legs slender, black with bronzy reflection, yellowish-white beneath; tibiæ and tarsi with bronzy luster beneath, mid legs with third and fourth tarsal joints whitish beneath; hind legs with base of fourth and fifth joints whitish beneath.

Length: Body about 3 mm.; wing 3 mm.

Male.—Coloration as in female. Fourth and fifth joints of middle tarsi dark, vestiture roughened, the last joint very short, third joint and apex of second silvery white-scaled, encircling the joints and merging beneath with the brassy color, which extends upward to base of leg; hind tarsi without white, front and

Digitized by Google

hind legs without conspicuous pale luster beneath. Abdomen expanded towards tip, the pale dorsal bands visible on fifth and sixth segments; tip with numerous coarse ferruginous hairs. Antennæ with the segments slightly shorter than in female, gradually thickened to insertions of hair-whorls; hairs of whorls long, but rather sparse; no secondary subapical whorls. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Genitalia (plate 6, fig. 40): Side-pieces slender, over three times as long as wide; clasp-filament with a long, slender branch at base, ending in an elliptical apical enlargement, cleft and hairy on margin; shaft again furcate, one branch short and smooth, the other very long and spicular at tip. Harpes long, flat, with a thickened margin, which is curved and dentate at tip. Harpagones small. Unci forming a basal cone. Basal appendages, each with three long spines.

Larva, Stage IV (plate 87, fig. 277).—Head rounded, a notch at insertion of antennæ, front margin arcuate. Antennæ slight, cylindrical, smooth, a small hair at outer third; a long spine, two short ones, and a long digit at tip. Eyes small, round. Head-hairs in multiple tufts. Mental plate wide, narrowly triangular; a high projecting central tooth and nine on each side, the basal ones more remote and deeply cut, the last a little larger. Mandible quadrangular with a filament from a notch before the tip; an outer row of long cilia form a collar; a row of feathered filaments on outer margin, the outer ones longest; dentition of four teeth on a process, the first longest; a broad filament and a row of short, feathered filaments within; process below short, taking the place of the basal angle, upper fork indicated only by the tuft, lower a slight pointed prominence with apical tuft; a row of fine hairs between upper tuft and dentition; a row of hairs within approximate to basal hairs. Maxilla conical, divided by a suture; inner half the larger, a band of coarse hairs at tip; outer half with two minute filaments next the suture and a subapical spine, which exceeds the apical hairs. Palpus very short, not more than one-third the length of the maxilla; apical digits small. Thorax subquadrate; hairs abundant. Abdomen slender, the hairs long. Air-tube slender, six times as long as wide, strongly tapered, at outer third less than half the basal width; surface smooth; subdorsal and subventral series of long, single, feathered hairs in a row on each side, the apical ones smaller and more remote; pecten a short series of long, closely crowded teeth. Lateral comb of eighth segment of many spines in two irregular rows; single spines very long, tips slightly widened and fringed with spinules. Anal segment about as long as wide, with a dorsal plate reaching well down the sides; dorsal tuft of three long hairs on each side; two long lateral hairs on plate; subventral hairs a pair of stellate tufts; no ventral brush. Anal gills nearly three times as long as the segment, lanceolate, subequal.

The larvæ live in the water between the leaves of bromeliaceous plants. The eggs are unknown.

Island of Trinidad and Tobago Island, British West Indies.

Sangre Grande, Trinidad, larvæ in water in bromelias (F. W. Urich); Port of Spain, Trinidad, larvæ in water in bromelias, associated with *Wyeomyia telestica* and *Culex imitator* (F. W. Urich); Tobago Island, near Trinidad, larvæ in water between leaf-sheaths of bromelias, July 13, 1905 (A. Busck).

Wyeomyia trinidadensis was referred by Theobald as a synonym of his *W. longirostris* from Brazil. We have a single specimen of the latter species from São Paulo, Brazil, kindly sent us by Dr. Lutz. This shows the vestiture of the mesonotum of a dark bronzy and blue iridescence, whereas the specimens from Trinidad have these scales of a dull gray-brown; we therefore think that they represent distinct species.

Digitized by Google

WYEOMYIA MINOR Dyar & Knab.

Wyeomyia minor Dyar & Knab, Proc. Biol. Soc. Wash., xix, 138, 1906.
Wieomyia minor Pazos, San. y Ben., ii, 51, 678, 1909.
Wyeomyia minor Theobald, Mon. Culic., v, 624, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA MINOR:

Head blackish, a silvery spot on vertex; proboscis black; prothoracic lobes silvery white; thorax light bronzy brown; pleurae and coxae silvery; abdomen black, pale beneath; legs dark, femora and tibiae pale below, middle pair without whitish on tarsi above; hind pair with the tarsi from side view silvery at the bases of the joints.

7 specimens, Baracoa, Cuba, September, 1901 (A. Busck).

Type.—Cat. No. 9992, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF WYEOMYIA MINOR (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, swollen apically, labellae small, rounded, with fine outstanding setae; vestiture with bronzy reflection. Palpi short, flattened, one-eighth as long as proboscis, bronzy black. Antennae moderate, the joints slender, subequal, rugose, pilose, black; tori subspherical with a cup-shaped apical excavation, yellowish with a silvery-white pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded triangular, convex, slightly pruinose, luteous brown. Eyes separated at vertex by a rather broad wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a silvery-white spot at vertex and a narrow white border along lower half of eye, widening to a patch below.

Prothoracic lobes elliptical, remote dorsally, clothed with flat scales, silvery-white; a row of black setae anteriorly. Mesonotum clothed with elliptical, flat brown scales, with bronzy reflections; scales on anterior lateral angles whitish. Scutellum trilobate, with the vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a low, broad median carina, dark-brown, a group of small setae on the posterior margin. Pleurae dark-brown, the coxae luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, truncate at tip, with long, dark-brown terminal setae; dorsal vestiture black, with a slight bronzy metallic reflection; eighth segment dorsally silver-scaled; venter white, the colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell over one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant nearly its own length from anterior cross-vein; outstanding scales of veins long, ligulate, brown, with bronzy reflection on costa, denser on forks of second, third and upper branch of fourth vein outwardly. Halteres whitish, with dark knobs.

Legs rather slender, brown, with a bronzy and blue reflection; femora and tibiae pale beneath; hind legs with basal half of first tarsal joint white beneath, the other joints with a basal white mark beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.2 mm.; wing 2.5 mm.

Life history and habits unknown.

Cuba.

Baracoa, September, 1901 (A. Busck).

WYEOMYIA BAHAMA Dyar & Knab.

Wyeomyia smithii Coffin (not Coquillett), in Shattuck, The Bahama Isls., 282, 1905.
Wyeomyia bahama Dyar & Knab, Proc. Biol. Soc. Wash., xix, 138, 1906.
Wyeomyia bahama Johnson, Psyche, xv, 70, 1908.
Wyeomyia bahama Theobald, Mon. Culic., v. 623, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA BAHAMA:

Proboscis black, bronzy beneath, rather short, much thickened at the tip; head black, a white spot at vertex, silvery at the sides; prothoracic lobes silvery; thorax

Digitized by Google

bronzy brown; pleuræ and coxæ silvery; abdomen black above, silvery white below. Femora and tibiæ blackish, pale beneath; second to fifth joints of tarsi of hind feet whitish at base from side view.

16 specimens, Tarpon Bay, Bahama Islands (T. H. Coffin).

Type.—Cat. No. 9990, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF WYEOMYIA BAHAMA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather short, enlarged apically, labellæ small, rounded, with fine outstanding setæ; vestiture black with bronzy reflection. Palpi short, flattened, one-sixth as long as the proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, yellowish, with a silvery-white pruinosity; hairs of whorls moderate, rather sparse, black. Clypeus rounded triangular, convex, silvery pruinose. Eyes separated at vertex by a rather broad wedge, bluish black. Occiput clothed with flat, brown scales with a slight metallic blue and bronzy reflection, a white patch on lower parts of sides and one at the vertex between the eyes, a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with flat silvery-white scales, a row of setæ along the anterior margin. Mesonotum clothed with elliptical, flat, brown scales with submetallic bronzy reflection; the scales on anterior lateral angles whitish; a group of setæ on anterior margin and at roots of wings. Scutellum trilobate, with the vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a low, broad median carina, brown, a group of small setæ near posterior margin. Pleuræ and coxæ luteous, clothed with elliptical, flat, silvery-white scales and a few long, black setæ.

Abdomen subcylindrical, truncate at tip, with long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; last segment silvery, with coppery luster in the middle; venter silvery white, the colors separated at the sides in a straight line, scales along ventral line somewhat raised.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant nearly its own length from anterior cross-vein; outstanding scales of veins long, ligulate, brown, with bronzy and blue reflection on costa, denser at tip of wing. Halteres whitish, with brownish knobs.

Legs rather long and slender, femora brown, with a bronzy and blue reflection, pale beneath; hind legs with tibiæ and basal half of first tarsal joint whitish beneath, second, third, fourth, and fifth joints marked with white at base beneath; mid tarsi with apex of second and all of last three joints silvery-white beneath. Claw formula, 0.0–0.0–0.0.

Length; Body about 2.5 mm; wing 2.5 mm.

Life history and habits unknown.

Bahama Islands, British West Indies.

Tarpum Bay, Eleuthera, and Long Island, July 7, 1903 (T. H. Coffin); New Providence Island, February 28, 1915 (H. G. Dyar).

WYEOMYIA CONCHITA Dyar & Knab.

Wyeomyia conchita Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 264, 1909.
Wieomyia conchita Pazos, San. y Ben., ii. 50, 676, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA CONCHITA:

Proboscis moderate, distinctly swollen towards the apex. Occiput dark-scaled, with bronzy and iridescent luster, a patch of silver scales on the vertex. Prothoracic lobes entirely silver-scaled. Abdomen dark-scaled above with faint bronzy and blue luster, the tip silver-scaled, venter white-scaled, the colors separated on the sides in a straight line. Legs dark-scaled, paler with brassy luster beneath, the mid tarsi white beneath on the tip of the second and the last three joints, hind tarsi broadly white-marked at the bases of all the joints beneath. Wing-scales narrow.

Length, 2.5 mm.

Fourteen specimens, San Antonio de los Baños, Cuba (J. H. Pazos).

Type no. 12180, U. S. N. M.

Digitized by Google

DESCRIPTION OF FEMALE OF WYEOMYIA CONCHITA (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, enlarged apically, labellæ small, rounded, with fine outstanding setæ; vestiture black, with a faint bronzy luster. Palpi short, flattened, one-seventh as long as proboscis, bronzy brown. Antennæ moderate, the joints subequal, rugose, pilose, black; pilosity coarse; tori subspherical, with a cup-shaped apical excavation, brownish luteous, whitish pruinose; hairs of whorls moderate, rather sparse, black. Clypeus rounded triangular, convex, luteous brownish, pruinose. Eyes separated at vertex by a rather broad wedge, bluish black. Occiput clothed with flat, brown scales, with a slight metallic blue and bronzy reflection, a silvery white patch at sides and one at vertex between the eyes; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with flat silvery-white scales, a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat, brown scales, with submetallic, bronzy reflection, scales on anterior lateral angles whitish; a group of setæ on anterior margin and at root of wing. Scutellum trilobate, vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a low median carina, dark-brown, a group of small setæ on the posterior margin. Pleuræ and coxæ luteous, clothed with elliptical, flat, silvery-white scales and a few long, brown setæ.

Abdomen subcylindrical, truncate at tip, with numerous long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection, last segment silvery at sides and along hind margin; venter white, the colors separated at the sides in a straight line, the scales along the ventral line somewhat raised.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant nearly its own length from anterior cross-vein; outstanding scales of veins long, ligulate, brown, with bronzy and blue reflection on costa, denser and slightly broader at apices of second to fifth veins. Halteres whitish, with dark knob.

Legs rather long and slender, brown with bronzy and blue reflection, the femora pale beneath; hind tarsi with all the joints broadly white-marked at the base beneath, involving about two-thirds of the joint on the fifth; mid tarsi with a continuous white stripe on outside of third and fourth joints; tibiæ and fore tarsi pale-brassy beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

The larvæ live in water between the leaves of *Tillandsia* sp. (Bromeliaceæ) (J. H. Pazos).

Cuba.

San Antonio de los Baños (J. H. Pazos).

WYEOMYIA ARGYRURA Dyar & Knab.

Wyeomyia argyrura Dyar & Knab, Proc. U. S. Nat. Mus., xxxv., 70, 1908.
Wyeomyia argyrura Pazos, Anal. Acad. Cien. méd. ffs. y nat. Habana, xlv, 430, 1908.
Wieomyia argyrura Pazos, San. y Ben., ii, 51, 677, 1909.
Wyeomyia argyrura Theobald, Mon. Culic., v, 627, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA ARGYRURA:

Female.—Proboscis moderate, swollen at the tip, black-scaled; occiput dark-scaled with iridescent reflections, a diffuse silvery spot at the vertex, sides of the head white-scales, running up part way along the ocular margin; prothoracic lobes entirely silvery-scaled; mesonotum dark bronzy brown-scaled; abdomen black-scaled above with bluish reflection, the tip silver-scaled; beneath silvery-scaled, the colors separated on the sides in a straight line. Legs deep brown-scaled with bluish and bronzy reflections, femora and tibiæ white beneath as also the front tarsi, the white broader and more distinct on the third joint; on the hind legs all the tarsal joints

Digitized by Google

have silvery white basal marks beneath, which extend well towards the apex; mid tarsi with the apex of the second, and all of the succeeding joints silver white-scaled above and beneath. Length, 2.5 mm.

One specimen, San Antonio de los Baños, Cuba (J. H. Pazos).

***Type.*—Cat. No. 12009, U. S. N. M.**

Nearest to *W. sororcula* Dyar and Knab, but distinguished by the silvery tip of the abdomen.

DESCRIPTION OF FEMALE OF WYEOMYIA ARGYRURA (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, tip somewhat expanded, labellæ small, rounded, with fine outstanding setæ; vestiture black, with bronzy reflection. Palpi short, flattened, one-sixth as long as proboscis, bronzy brown. Antennæ moderate, the joints slender, subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, yellowish with a slight white pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, blunt, convex, brown, slightly pruinose. Eyes separated at vertex by a rather broad wedge, bluish black. Occiput clothed with flat, brown scales with a submetallic reflection, a silvery spot at vertex and a large, white spot at lower part of sides extending well up along margin of eye; a row of setæ along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with flat silvery-white scales, some coarse setæ along anterior margin. Mesonotum clothed with elliptical, flat brown scales with a bronzy and blue reflection; scales on anterior lateral angles whitish. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark-brown, a group of small setæ near posterior margin. Pleuræ partly brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, truncate apically and with numerous long dark-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; the last segment silver-scaled; venter white, the colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant nearly its own length from anterior cross-vein; outstanding scales of veins long, ligulate, brown, with a slight bronzy reflection on costa, denser at apices of second and third veins. Halteres whitish, with black knobs.

Legs rather long, slender, black with a bronzy reflection; femora pale beneath, tibiæ pale-brassy beneath; hind tarsi with all the joints broadly marked with silvery-white at base beneath; mid tarsi with the third and fourth joints silvery-white beneath; fore tarsi with silvery luster beneath on last three joints, merging into the bronzy luster of the other joints. Claw formula, 0.0–0.0–0.0.

Length: Body about 2 mm.; wing 2 mm.

Life history and habits unknown.

Cuba.

San Antonio de los Baños (J. H. Pazos).

WYEOMYIA VANDUZEEI Dyar & Knab.

Wyeomyia smithii Smith (in part), Rept. Mosq. N. J., 353, 1904.
Wyeomyia vanduzeei Dyar & Knab, Proc. Biol. Soc. Wash., xix, 138, 1906.
Dendromyia smithii Theobald (in part), Mon. Culic., iv, 611, 1907.
Wyeomyia vanduzeei Theobald, Mon. Culic., v., 623, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA VANDUZEEI:

Head brown with a silvery patch at vertex and one on each side of the occiput; proboscis black; prothoracic lobes silvery; thorax brown with two white spots in front; pleuræ silvery; abdomen blackish with bluish luster, white below; legs dark, pale beneath, middle pair with tip of third, fourth, fifth joints pale above; from side view the tarsal joints of hind legs show white at base.

Digitized by Google

12 specimens, Estero, Florida (J. B. Van Duzee), bred from larvæ in leaves of Bromelias.

Type.—Cat. No. 9988, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA VANDUZEEI:

Female.—Proboscis moderate and distinctly swollen apically, labellæ small, rounded, with fine outstanding setæ; vestiture bronzy-black. Palpi short, flattened, one-sixth as long as proboscis, bronzy-black. Antennæ moderate, the joints subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, yellowish, with a slight pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, luteous brown, slightly pruinose. Eyes separated at vertex by a rather broad wedge, bluish black. Occiput clothed with flat, brown scales, with a metallic reflection, a silver-white spot at vertex, a silvery patch below at sides, running up along margin of eye; a row of setæ along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with flat scales, silvery-white; a row of setæ in front. Mesonotum clothed with elliptical, flat, brown scales with a submetallic reflection; scales on lateral angles whitish. Scutellum weakly trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of brown bristles. Postnotum elliptical, prominent, with a broad, low median carina, dark-brown, a group of small setæ near posterior margin. Pleuræ dark-brown, the coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, truncate apically, and with numerous long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; the last segment silver-scaled along the posterior margin; venter yellowish white-scaled, the colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell more than one-third as long as its cell; that of second posterior cell slightly shorter than its cell; basal cross-vein distant nearly its own length from anterior cross-vein; outstanding scales of veins long, ligulate, black, with bronzy reflection on costa, denser at apices of second to fourth veins. Halteres whitish, with black knobs.

Legs rather long, slender, black, with a bronzy and blue reflection, femora and tibiæ pale-brassy beneath; fore tarsi with a silvery reflection beneath; mid tarsi, with apical portion of second, the third and fourth joints white beneath; hind tarsi broadly marked with white at base of each joint beneath. Claw formula 0.0–0.0–0.0.

Length: Body about 2 mm.; wing 2.5 mm.

Male.—Proboscis more gradually thickened than in the female; antennæ similar to those of the female, hairs of whorls slightly longer; palpi as in the female; wings slightly narrower than in the female, the venation and vestiture the same; abdomen subcylindrical, somewhat expanded towards apex, which bears numerous coarse bristles. Coloration similar to the female. Mid tarsi with first joint shorter and stouter than in front or hind legs, the tip of the second, and all of third, fourth, and fifth joints broadly silvery-white beneath, the first and second joints with a silvery luster beneath in some lights. Claw formula, 0.0–0.0–0.0.

Length: Body about 2 mm.; wing 2 mm.

Genitalia (plate 3, fig. 13): Side-pieces rather short, tips conically tapered; clasp-filament with a short stem, divided into three lobes, the inner one rather broad, pointed, with a row of long hairs on the margin; middle lobe thick, conically pointed, with a group of long hairs near base, two rows of fine ones outwardly, and a small lobe near tip; outer lobe long, slender. Harpes broad, inner margin thickened, ending in a pointed tip that bears several hairs.

Digitized by Google

Harpagones small, forming a basal cone. Unci similar to harpagones, but smaller. Basal lobes each with three setæ.

Larva, Stage IV (see figure of entire larva, plate 43).—Head rounded, with prominent hind angles; antennæ small, slender, with a single hair beyond the middle; head-hairs short, single. Thorax transverse, rounded subrectangular, mesothorax forming a wavy lateral outline; lateral hairs in part long, the long ones few, the short tufts abundant; dorsal hairs very small, single or in small tufts; a short, densely feathered tuft on lateral margin of prothorax. Abdomen rather stout, the segments submoniliform, slightly elongate posteriorly, of equal width; lateral hairs numerous on first and second segments, single on third to seventh; subdorsal and subventral hairs in small, sparse tufts, the subdorsal tufts in a single row. Air-tube slender, over five times as long as wide, uniform, tip conically tapered; a row of six small double tufts along anterior margin, a longer double tuft posteriorly, and two small tufts towards the tip; apical hooks small. Lateral comb of eighth segment a row of single spines nowhere doubled, becoming smaller ventrally. Anal segment about as long as wide with a large dorsal plate; dorsal tuft of four long hairs on each side; lateral tuft of two long hairs at angle of plate; subventral tuft of three rather long hairs. Anal gills large, three times as long as the anal segment, broad, with rounded tips and fine tracheæ.

The larvæ live in the water between the leaves of epiphytic plants (Bromeliaceæ) growing on trees. Mr. Junius B. Van Duzee obtained the larva at Estero, Florida. He writes:

"The movements of the larvæ from the bromelias in general are much more refined than those of other larvæ with which I have come in contact. In the first place, none of the *Bromelia* larvæ are so rapidly jerky as the movements of the other larvæ; their movements are more sedate; both old and young larvæ float upward and downward with a graceful undulating movement, and which they use much more effectively and more often than other larvæ. Another thing I notice is that they hang straight downward instead of horizontally or at an angle, and also that they remain in the same spot while taking air. The adults bite. Mosquitoes that hatched out from the same Bromelia water from which the specimens of larvæ were taken that I sent you, lost no time in drawing their fill of blood when I inserted my finger in the breeding-jar."

In reply to a query Mr. Van Duzee says:

"Yes, the bromelias contain larvæ all the year around . . . I find them in the fall, winter, and spring, and expect to find them there in the summer. The dews are very heavy here most of the year, and a dew-drop immediately slides down the leaf into the cup as soon as it strikes the bromelia leaf."

On the other hand, the bromelias at Miami, Florida, where the species also occurs, were all dry in March, as observed by Messrs. Dyar and Caudell.

The larvæ at Estero, Florida, were associated with *Wyeomyia antoinetta,* but this species was present in small numbers.

Southern Florida.

Estero, larvæ taken April 22 and May 6, 1906, in water between the leaves of Bromeliaceæ (J. B. Van Duzee); Osprey, adults captured July 19, 1901, August 31, 1901 (J. G. Webb); Biscayne Bay (Mrs. A. T. Slosson).

This species is very closely allied to *Wyeomyia argyrura* from Cuba, and we have some doubt whether the two forms should be separated specifically. We keep them separate, however, on the character used in the table until we obtain fuller material, and especially the larvæ of the Cuban form.

Digitized by Google

WYEOMYIA FRATERCULA Dyar & Knab.

Wyeomyia fratercula Dyar & Knab, Proc. Biol. Soc. Wash., xix, 139, 1906.
Wyeomyia fratercula Theobald, Mon. Culic., v, 624, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA FRATERCULA:

Prothoracic lobes silvery white; head black behind, a square, diagonally placed, white spot on the vertex, the sides below also white; front tibiæ above bronzy with only a slight blue reflection.

One specimen, Martinique, W. I., July (A. Busck).

Type.—Cat. No. 9995, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF WYEOMYIA FRATERCULA (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, swollen apically, labellæ small, rounded, with fine outstanding setæ; vestiture bronzy-black. Palpi short, flattened, one-eighth as long as proboscis, bronzy-black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, yellowish, with a silvery-white pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, brownish, pruinose. Eyes separated at vertex by a rather broad wedge, bluish black. Occiput clothed with flat, brown scales, with a blue metallic reflection, a silvery-white spot at vertex, a patch below running up shortly along eye margin; a row of setæ along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with flat scales, silvery-white; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat, light-brown scales with submetallic reflection; scales on anterior margin and lateral angles whitish. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, promiment, with a low, broad, median carina, brown, a group of small setæ near the posterior margin. Pleuræ dark-brown, coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed, truncate at tip, with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight bronzy and blue reflection; venter yellowish white, the colors separated at the sides in a straight line, the scales along median line suberect.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from the anterior cross-vein; outstanding scales of veins long, ligulate, black, with bronzy reflection on costa, denser and broader apically. Halteres whitish, with black knobs.

Legs rather long, slender, black, with a bronzy and blue reflection; femora whitish beneath; tibiæ and tarsi with a brassy luster beneath; mid legs with outer half of second and all of last three joints silvery-white beneath; hind legs, with basal half of first tarsal joint white beneath, the others with a broad white basal mark beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

The larva was obtained by Mr. Busck in water in an angle of the iron support of the roof of an old deserted sugar-mill. The species is probably addicted to Bromeliaceæ, but in this case the convenient corner of the iron-work, well above the ground and no doubt filled with dead leaves and insects, furnished a passable substitute.

Martinique, French West Indies.

Near Fort de France, larvæ in water in iron-work of an old mill, July 24, 1905 (A. Busck).

The single type specimen before us is the only specimen known.

Digitized by Google

WYEOMYIA SORORCULA Dyar & Knab.

Wyeomnia grayii Dyar & Knab (not Theobald), Journ. N. Y. Ent. Soc., xiv, 228, 1906.
Wyeomyia grayii Dyar (not Theobald), Proc. Ent. Soc. Wash., viii, 19, 1906.
Wyeomyia sororcula Dyar & Knab, Proc. Biol. Soc. Wash., xix, 139, 1906.
Wieomyia sororcula Pazos, San. y Ben., ii, 51, 678, 1909.
Wyeomyia sorocula Theobald, Mon. Culic., v, 624, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA SORORCULA:

Prothoracic lobes silvery white; head black behind, a square, diagonally placed, white spot on the vertex, the sides below also white, less broadly and squarely so than in *W. fratercula;* front tibiæ dark metallic-blue above.

53 specimens, San Francisco Mts., Santo Domingo, W. I., August and September (A. Busck).

Type.—Cat. No. 9996, U. S. Nat. Mus.

The larva of this species has been described under the name *Wyeomyia grayii* Theob. (Journ. N. Y. ent. soc., xiv, 228, 1906), as identified by Mr. Coquillett. *W. grayii* was described from Santa Lucia, and is most probably specifically distinct from any of the forms before us. We can not be clear on this point, for Theobald's description of *grayii* makes no mention of the color of the prothoracic lobes, so we do not even know if *grayii* belongs to the present group. However, each island seems to have its own species in this group of *Wyeomyia*, and the rule will probably hold good in this case.

DESCRIPTION OF FEMALE AND LARVA OF WYEOMYIA SORORCULA (MALE UNKNOWN):

Female.—Proboscis rather swollen towards tip, stout; labellæ small, rounded, with fine outstanding setæ; vestiture black, slightly roughened beneath. Palpi short, flattened, one-eighth as long as proboscis, bronzy-black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, yellowish, with a silvery-white pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, luteous pruinose. Eyes separated at vertex by a rather broad wedge, bluish black. Occiput clothed with flat, brown scales with a metallic reflection, a silvery-white spot at vertex and a narrow white border along lower half of eye, widening to a patch below.

Prothoracic lobes elliptical, remote dorsally, clothed with flat silvery-white scales. Mesonotum clothed with elliptical, flat, light-brown scales, with submetallic reflection; scales on lateral angles paler. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a low, broad median carina, dark-brown, a group of small setæ near posterior margin. Pleuræ dark-brown, coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed, truncate at tip, with many long dark-brown terminal setæ; dorsal vestiture black, with a slight bronzy and blue reflection; venter yellowish-white, the colors separated at the sides in a straight line, the scales along median line suberect.

Wings moderate, hyaline; petiole of second marginal cell nearly half as long as its cell; that of second posterior cell about as long as its cell; basal cross-vein distant its own length from anterior cross-vein; outstanding scales of veins long, ligulate, black, with blue reflection on the costa, denser and broader at apex of wing. Halteres whitish, with black knobs.

Legs rather long, slender, black with a bronzy and blue reflection; femora whitish beneath; tibiæ and tarsi with brassy luster beneath; mid legs, with apical portion of the second, and all of third, fourth, and fifth joints silvery-white within; the hind tarsi have the basal halves of all the joints white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Larva, Stage IV (plate 88, fig. 278).—Head rounded; eyes small. Antennæ small, smooth, with a single hair at outer third; four irregular spines and a

Digitized by Google

digit at tip. Mental plate triangular, with a long central tooth and twelve on each side, all very even and regular. Mandible quadrangular, triangularly widened outward; a filament before tip; an outer row of cilia from a collar, which is nearly parallel to the outer margin; a short row of branched filaments on the outer margin, followed by a slender detached one; dentition of four teeth on a process, the first the longest; a long spine before, a broad lamella and a stout filament with divided tip within; process below continuous with the basal angle, scarcely produced, irregularly indented on outer edge; a row of hairs along outer margin; a row of feathered hairs within and a row of long ones at base. Maxilla irregularly spherical, unevenly divided by a suture; inner portion much the larger, inner surface covered with long spinose hairs, mixed with stout spines on margin; a conical prominence at tip, succeeded by a row of hairs along the suture: outer portion with two small filaments next the suture. Palpus small, with four small apical digits. Thorax rounded, wider than long, the hairs long. Abdomen slender, the segments rounded; lateral hairs multiple on first two segments, single on the succeeding ones, all long. Air-tube conically tapered, about five times as long as wide, dark with a pale tip; four double subdorsal hairs and four single subventral ones; no pecten. Lateral comb of eighth segment a very long row of single teeth; teeth conical, with even spinules at tip. Anal segment about as long as wide, with a dorsal plate reaching well down the sides; dorsal tuft of four long hairs in pairs on each side; two long lateral hairs on the plate; a pair of small subventral tufts; no ventral brush. Anal gills moderate, equal.

Mr. Busck obtained the larvæ in the San Francisco Mountains of Santo Domingo, August 29, 1905, in water between the leaves of an epiphytic plant (Bromeliaceæ), associated with *Wyeomyia mitchellii*. He also captured a number of specimens of the females which came in the daytime to the porch of the house to bite and were annoying.

Santo Domingo and Cuba.

San Francisco Mountains, Santo Domingo, August and September, 1905 (A. Busck); San Antonio de los Baños, Cuba (J. H. Pazos).

WYEOMYIA CHRYSOMUS (Dyar & Knab).

Phoniomyia chrysomus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 208, 1907.
Phoniomyia chrysomus Busck, Smiths. Misc. Colls., quart. iss., iii, 75, 1908.
Phoniomyia chrysomus Theobald, Mon. Culic., v, 579, 1910.

ORIGINAL DESCRIPTION OF PHONIOMYIA CHRYSOMUS:

♂.—Proboscis long and slender, black; occiput dark scaled, a small silvery spot on the vertex; prothoracic lobes prominent, clothed with shining coppery scales; mesonotum and scutellum clothed with dark scales with faint greenish and bronzy luster, setæ of scutellum dark; metanotum deep brown with a group of setæ; abdomen black above with faint bluish sheen, beneath silvery white, the colors separated in a straight line; legs dark, with brassy reflection beneath, the mid legs with the third and fourth tarsal joints and the apex of the second silvery white at the side.

Length.—2.5 mm.

One specimen, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in water in leaves of Bromelias.

Type.—No. 10854, U. S. National Museum.

DESCRIPTION OF MALE OF WYEOMYIA CHRYSOMUS (FEMALE AND LARVA UNKNOWN):

Male.—Proboscis long and slender, uniform, labellæ conically tapered, with fine outstanding setæ; vestiture black, a line of lustrous silvery scales beneath. Palpi small, one-tenth as long as proboscis, clothed with black scales and rather long, fine setæ. Clypeus rounded-triangular, dark-brown, slightly pruinose. Antennæ moderate, the joints slender, subequal, the last joint shorter than the preceding ones and slightly thicker, rugose, coarsely pilose, black; tori sub-

Digitized by Google

spherical, with a cup-shaped apical excavation, dark-brown, slightly pruinose; hairs of whorls rather long, moderately abundant, black. Eyes separated on vertex by a narrow wedge, black. Occiput clothed with flat, appressed scales, black with blue and green reflection, a vertical white patch between the eyes, a white patch at the sides below, a row of setæ along margin of eyes.

Prothoracic lobes separated dorsally, brown, clothed with coppery scales with a violaceous golden reflection. Mesonotum black, clothed with flat, brown scales, with obscure bronzy luster, anterior margin silvery-white scaled. Scutellum trilobate, clothed with scales similar to mesonotum, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, blackish, a tuft of small setæ posteriorly. Pleuræ brown, coxæ luteous, clothed with elliptical, silvery-white scales.

Abdomen subcylindrical, compressed to apical third, with many coarse, black terminal setæ, apex somewhat enlarged; dorsal vestiture black, with a submetallic bronzy and blue reflection; venter yellowish-silvery-white, the colors separated on the sides in a straight line, the last segment dark.

Wings rather narrow, hyaline; petiole of second marginal cell less than half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein less than its own length from anterior cross-vein; outstanding scales of veins long, ligulate, black, with a bronzy-blue reflection on costa, those at apex of wing denser and slightly broader. Halteres largely blackish.

Legs rather long and slender, black with a bronzy and blue reflection, trochanters silvery-white beneath, femora and tibiæ pale-brassy beneath, mid legs with tips of second and all of third and fourth tarsal joints white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 3, fig. 14): Side-pieces over twice as long as broad, tips much tapered; basal lobes rounded triangular, setose; three long setæ in a row. Clasp-filament short, stout, divided into three lobes; inner one slender, smooth; middle one broad, conically tapered, bearing rows of setæ; outer one slender, with several teeth towards the tip. Harpes broad, with a thickened margin, the tips curved and obscurely dentate. Harpagones forming a basal cone. Unci forming a similar, smaller cone. Basal appendages small, each with three setæ.

The larvæ were obtained by Mr. Busck in water in the leaves of an epiphytic bromeliad growing on a tree in a native village near Tabernilla, Canal Zone, Panama, associated with *Orthopodomyia phyllozoa,* but no larval skins were preserved.

Panama.

Tabernilla, Canal Zone, June 25, 1907 (A. Busck).

This species is similar to *Wyeomyia luteoventralis,* from Pará, Brazil (Theobald, Mon. Culicid., ii, 348, 1901), and *Wyeomyia quasiluteoventralis,* from British Guiana (Theobald, Mon. Culicid., iii, 317, 1903), the types of which Dr. Howard has examined in the British Museum. He reports: "Prothoracic lobes with purplish-coppery scales; middle tarsi with the three terminal joints whitish; eye margin narrowly white above, broadly so below; proboscis not swollen." This report covers both species. It is possible that they are the same and that *W. chrysomus* is a synonym. These species, however, should have broad wing-scales, as they were referred by Theobald to *Dendromyia,* which is characterized by broad wing-scales. Our species has narrow wing-scales. We are aware of Theobald's figure of the wing of *Dendromyia luteoventralis* (Mon. Culicid., iii, 318, 1903), showing narrower scales; but we can not tell from what specimen it was made, as he cites several new and widely separated localities, and may have had several species confused under this name. We therefore retain the name *Wyeomyia chrysomus* for the form before us.

Digitized by Google

WYEOMYIA AGNOSTIPS Dyar & Knab.

Wyeomyia agnostips Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 211, 1907.
Wyeomyia agnostips Busck, Smiths. Misc. Colls., quart. iss., iii, 74, 1908.
Wyeomyia agnostips Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA AGNOSTIPS:

Proboscis rather slender, distinctly swollen towards the tip, black scaled; palpi short, black scaled; clypeus prominent, black; occiput dark scaled, with blue and green iridescence, the eyes not margined by pale, a small silvery spot at the vertex, at the sides and beneath bright silvery; prothoracic lobes large and prominent, well separated, clothed with shining coppery scales, which become violaceous on the sides; pleura silver scaled; mesonotum clothed with brown scales, with slight metallic luster, basally and on the scutellum with faint greenish reflection, setæ at the bases of the wings and on the scutellum golden yellow; metanotum pitchy brown with a bluish bloom, a group of setæ towards the apex; abdomen compressed, clothed above with black scales with greenish luster, beneath with creamy white shining vestiture, the colors separated in a straight line on the sides; legs dark, brassy beneath, the middle pair with the apical three fourths of the second joint and all the succeeding joints silvery white on the inner side, hind legs with the fourth and fifth tarsal joints white on the inner side. Length, 4.5 mm.

One specimen, Tabernilla, Canal Zone, Panama (August Busck, collector), captured in bamboo woods.

Type.—No. 10858, U. S. National Museum.

DESCRIPTION OF FEMALE OF WYEOMYIA AGNOSTIPS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather short and stout, swollen at tip, labellæ with fine outstanding setæ; vestiture bronzy-black. Palpi short, flattened, one-sixth as long as proboscis, bronzy-black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark-brown. Eyes separated at vertex by a narrow wedge, bluish-black. Occiput clothed with flat brown scales with a metallic blue reflection, a small silvery-white spot at vertex, a large patch at lower part of sides; a row of setæ along margin of eyes.

Prothoracic lobes prominent, collar-like, remote dorsally, clothed with flat, shining, golden and coppery scales, with a violaceous luster in some lights, a row of setæ along front margin. Mesonotum clothed with elliptical, flat, brown scales with a submetallic reflection; scales on lateral angles whitish; a group of ferruginous bristles over roots of wings. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of brown bristles. Postnotum elliptical, prominent, with three lines converging towards the posterior angle, dark-brown, a group of small setæ near the posterior margin. Pleuræ dark-brown, coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight greenish and coppery metallic reflection; venter yellowish-white, submetallic, colors separated at sides in a straight line, the scales raised along the ventral line, the seventh segment with a median line of brownish raised scales.

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell; that of second posterior cell much shorter than its cell; cross-veins incident, outstanding scales of the veins broadly ovate, mostly obliquely truncate, brown with blue reflection on costa, shorter and denser apically. Halteres whitish, with black knobs.

Legs rather long and slender, black with a bronzy reflection; femora and tibiæ of hind legs pale-golden beneath; tibiæ and tarsi with a pale-bronzy luster beneath; mid tarsi with apical two-thirds of second and all the succeeding joints silvery-white beneath. Claw formula, 0.0–0.0–0.0.

Digitized by Google

Length: Body about 4 mm.; wing 4 mm.

The single specimen was captured in bamboo woods in the daytime.

Panama.

Tabernilla, Canal Zone, adult captured in bamboo woods, May 3, 1907 (A. Busck).

This species is referred by us to *Wyeomyia,* although the generic characters are not well shown. The strip of integument between the eyes is very narrow and but slightly wedge-shaped; the prothoracic lobes are rather closely approximated, and more prominent than is usual in the genus; the cross-veins are incident, and the wing-scales broad and asymmetrical, all the characters showing an approach to *Sabethinus.* The species is therefore intermediate, but the characters are not sufficiently prominent to keep the species out of *Wyeomyia,* nor do they warrant the erection of a separate genus for the species.

WYEOMYIA APORONOMA Dyar & Knab.

Wyeomyia aporonoma Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 227, 230, 1906.
Wyeomyia aporonoma Busck, Smiths. Misc. Colls., quart. iss., iii, 71, 1908.

ORIGINAL DESCRIPTION OF WYEOMYIA APORONOMA:

The air tube is pale, straight, tapered only near tip, with scattered single hairs. Lateral comb of the eighth segment of scales in a broad band, beginning above in single teeth, then a double row below, the teeth smaller. Anal segment with the subventral tuft small and stellate. Anal plate and tube with a black basal border. Body hairs fine, stellate.

The junior author got the larvæ at Sonsonate and San Salvador, Salvador; Santa Lucrecia, Mexico; Port Limon, Costa Rica. They were in cocoanut shells, a hollow in a stump of a banana tree and cacao shells. The species was named "*Dendromyia? quasiluteoventralis* Theob." but we have been averse to adopting a name so doubtful.

The following is an abstract of the table:

1.	Anal processes equally developed	3
3.	Lateral comb of the eighth segment of many teeth in a long line	4
4.	Comb of teeth in a band, at least in part two rows deep	7
7.	Tube without false pecten	9
9.	Tube straight, tapered only near tip; tube and plate with black basal ring	*aporonoma*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA APORONOMA:

Female.—Proboscis moderate, the tip somewhat expanded, the labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black, silvery whitish beneath nearly to tip. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish, with a silvery-white pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, silvery pruinose. Eyes separated at vertex by a very narrow wedge, bluish black. Occiput clothed with flat black scales, with a blue reflection, a small coppery metallic spot at vertex and a large white spot at lower part of sides; two long setæ at vertex and a row of short ones along margins of eyes.

Prothoracic lobes rather large, collar-like, remote dorsally, clothed with flat, coppery-golden scales with violaceous reflection; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales, with bronzy and blue reflection; scales below lateral angles with brassy luster; bristles at roots of wings reddish brown, those on anterior margin dark. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of brown bristles. Postnotum elliptical, prominent, with a broad, low, median carina, black in the middle, luteous laterally, a group of

Digitized by Google

small setæ near the posterior margin. Pleuræ and coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed on basal half, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight bronzy and blue reflection; venter yellowish white, colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell less than one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant much less than its own length from anterior cross-vein; scales of veins dense, short, broadly oval, black, with a slight bronzy reflection on costa, denser apically, especially on second and third veins. Halteres whitish, with black knobs.

Legs rather long and slender, black with a bronzy reflection, femora whitish beneath; tibiæ and tarsi with a pale bronzy luster beneath; hind tarsi with basal three-fourths of fourth and all of fifth joints white beneath; scales at base of hind tarsi slightly roughened. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

Male.—Proboscis and palpi as in the female; antennæ also similar, the joints elongate, cylindrical, slender, slightly thickened at insertions of whorls, hairs longer and more abundant than in the female, the last joint about equal to the preceding one, slightly thickened, very coarsely pilose. Coloration as in the female. Wings narrower than in the female, the vestiture sparser, cross-veins incident. Middle legs with a silvery luster throughout on the under side; hind legs marked as in the female. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Genitalia (plate 5, fig. 31): Side-pieces stout at base, attenuated at apex, insertion of clasp-filament indistinct; three long hairs towards base; basal lobes setose; clasp-filament slender, long, a spine at basal third, a prominence at outer third, tip very slender, twice angled, pointed, with small spines at first angle. Harpes broad, inner edge thickened, curving at tip and ending in a few teeth. Harpagones forming a basal cone. Unci forming a cone similar to the harpagones, but smaller. Basal appendages low, each bearing five small setæ.

Larva, Stage IV (see figure of entire larva, plate 44).—Head rounded, hind-angles roundedly prominent, a thick black margin on foramen, sides slightly arcuate, front margin broadly arcuate, with a slight notch at antennal insertion. Antennæ moderate, cylindrical, smooth, without hair; four hairs and an attenuated digit at apex. Eyes small, round. Dorsal head-hairs single, ante-antennal tuft triple. Mental plate triangular; central tooth large, with eleven side teeth, the basal ones more remotely placed. Mandible quadrangular, slightly spinulated at base; a filament before tip; an outer row of cilia from a collar; a dense row of ten divided filaments on outer margin; dentition of four teeth on a process, the outer long; a broad filament and five feathered hairs with tufted tips within; process below long, but projecting only slightly beyond the basal articulation, tip widely but shortly furcate, with long tufts at end of each limb and a row of hairs on outer margin; no basal angle, the inner and basal long hairs nearly continuous. Maxilla irregularly hemispherical, divided by a suture; inner half large, with a row of coarse teeth on margin and a line of fine hairs within; a row of long hairs at tip; outer half small, lunate; a single filament next the suture, with cleft tip; a small spine on the other side. Palpus small, with four minute terminal digits. Thorax rounded quadrangular, much wider than long; hairs abundant, long; short hairs in small tufts. Abdomen slender, segments widening posteriorly; lateral hairs on first two segments multiple, double on third to fifth, single on sixth and seventh; short hairs in

Digitized by Google

tufts. Tracheal tubes moderately broad, band-shaped, strongly flexuous, narrowed in seventh and eighth segments. Air-tube slender, slightly tapered on outer two-fifths, with single scattered hairs; a black ring at base. Lateral comb of eighth segment a rather long band of spines, single above but widening to two or three deep below, the lower ones smaller; single spine thorn-shaped, pointed from the side view, broad, with seven terminal spinules from the top view. Anal segment as long as wide, with a dorsal plate completely cut at corners and edged by a black rim; dorsal tuft of two groups of long hairs on each side; two long lateral hairs at angle of the plate; a pair of small subventral tufts. Anal gills moderate, broad, twice as long as the segment, with rounded tips and fine tracheæ, all four equal.

The larvæ live in water in dead vegetable tissues, such as tree-stumps, cocoanut-shells and cacao-husks, containing much vegetable detritus and rich in organic matter. Mr. Busck observes:

"The larvæ are long, slender, and moniliform, with yellow head, short tube, and long anal appendages; they hang perpendicularly from the surface of the water when breathing, but can remain very long under water and burrow down into the sediment on the bottom when disturbed; they are thus easily overlooked."

Central America and Panama.

Sonsonate, Salvador, larvæ from water in cocoanut-husks, August 30, 1905 (F. Knab); Zent, 20 miles inland from Port Limon, Costa Rica, larvæ in very dark-brown liquid in the hollow stump of a banana tree, September 16, 1905, associated with *Culex mortificator* (F. Knab); Port Limon, Costa Rica, larvæ in cacao-husks in cacao orchard, September 28, 1905, associated with *Limatus cacophrades* (F. Knab); Gatun, Canal Zone, Panama, larvæ in a hollow tree-stump, June 10, 1907, associated with *Hæmagogus albomaculatus* (A. Busck); Caldera Island, Panama, larvæ in a hollow in the stump of a banana tree, May, 29, 1908 (A. H. Jennings); Tabernilla, Canal Zone, Panama, larvæ in bamboo-traps, December 15, 1908 (A. H. Jennings); Las Cascadas, Canal Zone, Panama, May 17, 1908, larvæ in a tree-hole (R. L. Turner).

The specimens are all bred and have been killed too soon after emergence, so that the eyes and other parts of the head are much shrunken and invaginated. As a consequence we are unable to see the exact condition of the strip of integument between the eyes. It is evidently very narrow, the eyes seeming practically contiguous above. We assume that the strip widens somewhat below, although this part is concealed in all the specimens. The species seems closely allied to the preceding species (*W. agnostips* D. & K.), having similar coloration and structure of the wing-veins, so that it seems probable that the head structure is also similar. Later specimens show a very narrow strip between the eyes, widening to a wedge below.

WYEOMYIA GUATEMALA Dyar & Knab.

Wyeomyia guatemala **Dyar & Knab, Proc. Biol. Soc. Wash., xix, 139, 1906.**
Wyeomyia ablechra **Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 66, 1908.**
Wyeomyia guatemala **Theobald, Mon. Culic., v, 624, 1910.**
Wyeomyia ablechra **Theobald, Mon. Culic., v, 626, 1910.**

ORIGINAL DESCRIPTION OF WYEOMYIA GUATEMALA:

Prothoracic lobes silvery white; head black on the occiput, a very narrow white margin to the eyes, distinct at vertex and sides, nearly obsolete at the middle. Body and legs colored as in the other species of this group.

Two specimens, Trece Aguas, Alta Vera Paz, Guatemala, April (Schwarz and Barber).

***Type.*—Cat. No. 9994, U. S. Nat. Mus.**

Digitized by Google

ORIGINAL DESCRIPTION OF WYEOMYIA ABLECHRA:

Female.—Proboscis long and slender, dilated at the apex, black-scaled; palpi slender, black-scaled; occiput dark-scaled, with blue and green reflections, the margin of the eyes dull whitish scaled, interrupted on each side below the vertex; prothoracic lobes metallic violaceous, a large patch of silvery scales at the apex, basal portion silvery-scaled; mesonotum dark-scaled, with faint bronzy and blue reflections; abdomen dark-scaled above, with slight blue reflection, beneath white-scaled, the colors separated on the sides in a straight line; legs dark-scaled, with bronzy reflection; on the mid-legs the apical portion of the second tarsal joint and all of the third, fourth, and fifth silvery white beneath; hind legs with a dash of silvery white at the bases of all the tarsal joints beneath. Length, 3.5 mm.

Eighteen specimens, Sonsonate, Salvador, August 16, 1905 (F. Knab).

Type.—Cat. No. 11985, U. S. N. M.

DESCRIPTION OF FEMALE OF WYEOMYIA GUATEMALA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, tip somewhat expanded, labellæ small, rounded, with fine outstanding setæ; vestiture bluish black, brighter bronzy beneath. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, with a slight pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, blackish brown, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales, with an iridescent reflection, a white line at margin of eyes, somewhat narrowed at vertex, a large white spot at lower part of sides; two long setæ at vertex and a row of small ones along margin of eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat, bronzy-violaceous scales, the apices and bases silvery. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection, the scales on front edge and below the lateral angles whitish; bristles over roots of wings brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, with a broad, low median carina, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight bronzy and blue reflection; venter white; colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell from one-fourth to nearly one-half as long as its cell, that of second posterior cell about as long as its cell; basal cross-vein distant less than its own length from the anterior cross-vein; scales of veins moderate, ligulate, black, broader and denser on apical part of the wing, a slight bronzy reflection on costa. Halteres whitish, with large black knobs.

Legs rather long and slender, black with a bronzy reflection, the femora pale beneath; tibiæ brassy beneath; middle tarsi with apical half of the second and all of last three joints silvery white on outer side; hind tarsi with a small white mark at base of each joint beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Mr. Knab captured adults as they came to bite in the daytime, in a shady lane between plantations.

Central America.

Cacao, Trece Aguas, Alta Vera Paz, Guatemala, March 29, April 14 and 15, 1906 (Schwarz and Barber); Sonsonate, Salvador, August 19 and 30, 1905 (F. Knab); San Salvador, Salvador, August 16, 1905 (F. Knab).

In our original description of this species we made an error of observation and described the prothoracic lobes as "silvery white." We consequently failed to

Digitized by Google

recognize the species in Mr. Knab's Salvadorean specimens and redescribed the species, creating a synonym. The reëxamination of the specimens for this monograph led to the discovery of the error.

As far as we have observed, all the species of *Wyeomyia* with silvery prothoracic lobes are confined to the West Indies, none occurring upon the mainland, except in southern Florida, which has an essentially West Indian fauna.

WYEOMYIA MEGALODORA Dyar & Knab.

Wyeomyia megalodora Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 69, 1908.
Wyeomyia megalodora Theobald, Mon. Culic., v, 626, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA MEGALODORA:

Female.—Proboscis long and rather slender, swollen at the apex; occiput dark-scaled, obscurely iridescent, margin of the eyes narrowly dull white-scaled; prothoracic lobes pale violaceous, iridescent, without light scales at the apices; mesonotum dark brownish-scaled, with obscure bronzy and bluish luster; abdomen above blackish-scaled, with faint bronzy and bluish luster, beneath coarsely white-scaled, the colors separated on the sides in a straight line; legs dark-scaled, with bronzy and bluish reflections; the tarsi of the front and hind legs unmarked; the middle legs, with the apical half of the second and all of the succeeding joints, silvery white-marked beneath. Length, 3.5 mm.

Two specimens, Sonsonate, Salvador, August 30, 1905. (F. Knab.)

Type.—Cat. No. 11993, U. S. Nat. Mus.

The prothoracic lobes in certain lights have a shining appearance at their apices, but do not seem to be clothed with differently colored scales from those of the general surfaces of the lobes.

DESCRIPTION OF FEMALE OF WYEOMYIA MEGALODORA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, tip expanded, labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black, paler beneath. Palpi short, flattened, slender, one-seventh as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, yellowish brown, with whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, yellowish brown, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales, with a bronzy and blue reflection, a dull-white margin behind the eyes joining a large silvery-white spot at lower part of sides; two long setæ on vertex and a row of smaller ones behind the eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat bronzy violaceous scales; a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales, with bronzy and blue reflection; scales below lateral angles and a few on anterior margin whitish; setæ over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with low, broad median carina, dark brown, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long dark-brown terminal setæ; dorsal vestiture black, with a slight bronzy and blue reflection; venter yellowish white, the colors separated at the sides in a straight line, the scales raised along the mid-ventral line.

Wings moderate, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant much less than its own length from anterior cross-vein; scales of veins ligulate, black, with a slight bronzy reflection on costa, broader and denser on forks of second vein and on apical portions of third and fourth veins. Halteres whitish, with black knobs.

Digitized by Google

Legs long and slender, black with bronzy reflection, the femora whitish beneath; tibiæ and tarsi with a bright bronzy luster beneath; middle legs with tip of second and all of third to fifth tarsal joints white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.5 mm.

The adults were taken by Mr. Knab as they came to bite, in a shady lane between plantations.

Salvador.

Sonsonate, August 30, 1905 (F. Knab).

WYEOMYIA ABASCANTA Dyar & Knab.

Wyeomyia abascanta Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 65, 1908.
Wyeomyia abascanta Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA ABASCANTA:

Female.—Proboscis moderately long and slender, somewhat swollen at the apex, black-scaled; occiput dark-scaled, with blue and green metallic reflection, the margin of the eyes dull white-scaled; prothoracic lobes dark-scaled, with blue, purple, and bronzy reflections, a patch of silvery white scales at the apex, basal portion silvery white scaled; mesonotum bronzy-brown scaled, with dark bluish reflection; pleura silvery-white scaled; abdomen dark-scaled above, beneath coarsely white-scaled, the colors separated on the sides in a straight line; legs dark, with bronzy and blue reflections, the mid legs with the apex of the second tarsal joint, all of the third and fourth joints and part of the fifth silvery white-scaled on the under side. Length, 3.5 mm.

Male.—The markings are as in the female.

Two specimens, Trinidad, British West Indies, June. (A. Busck.)

Type.—Cat. No. 11983, U. S. N. M.

DESCRIPTION OF FEMALE AND MALE OF WYEOMYIA ABASCANTA (LARVA UNKNOWN):

Female.—Proboscis rather long, tip expanded, labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black, paler beneath. Palpi short, flattened, one-seventh as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical with a cup-shaped apical excavation, yellowish, with a slight white pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, yellowish, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a bronzy and blue reflection, a narrow dull-white margin behind the eyes, joining a large white spot at lower part of sides; two long setæ at vertex and a row of short ones along margins of eyes.

Prothoracic lobes large, elliptical, distinctly separated, clothed with flat bronzy-violaceous scales; a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales, with a bronzy and blue reflection, scales below lateral angles and a few on anterior margin whitish; setæ over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, with a low median carina, a group of small setæ near the posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long dark-brown terminal setæ; dorsal vestiture black, with a slight bronzy and blue reflection; venter yellowish white, the colors separated at the sides in a straight line; scales along mid-ventral line somewhat raised.

Wings moderate, hyaline; petiole of second marginal cell less than one-half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from the anterior cross-vein; scales of veins ligulate, black, with a slight bronzy reflection on costa, broader and denser on forks of second and fourth veins and on third vein, particularly towards tip of wing. Halteres whitish, with black knobs.

Digitized by Google

Legs rather long and slender, black, with a bronzy reflection, the femora whitish beneath; tibiæ and tarsi with a bronzy luster beneath; middle legs with tip of second and all of third and fourth joints silvery white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.2 mm.

Male.—Proboscis as in the female. Palpi minute. Antennæ similar to those of the female; hairs of whorls longer and more abundant. Coloration as in the female. Wings slightly narrower, vestiture sparser, basal cross-vein about its own length from anterior cross-veins. Legs marked as in the female, the white on mid tarsi situated on outer side, the bronzy luster beneath strong. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 4, fig. 19): Side-pieces long, about three times as long as wide, the tips sharply conical; a conical lobe at basal third within covered with fine hairs. Clasp-filament with a slender stem, constricted slightly at its apical third and an expanded terminal portion, which is rounded quadrate, setose, inner edge revolute, with a row of hooked spines and a small, elliptical, bent prominence, the outer edge thickened and revolute. Harpes slender, with a pair of appendages at tip. Unci broad and short.

Larva.—Our specimen is too much broken to be described. Only a part of the head remains.

Mr. Busck found the larvæ in water in the leaf-sheaths of a terrestrial bromeliad, resembling a century-plant, growing on the pitch lake at La Brea, Trinidad, associated with *Culex imitator*.

Trinidad, British West Indies.

La Brea, bred from larvæ, July 8, 1905 (A. Busck).

WYEOMYIA VIOLESCENS Dyar & Knab.

Wyeomyia smithii Pazos (not Coquillett), Bull. Soc. ent. de France, 135, 1904.
Wyeomyia violescens Dyar & Knab, Proc. Biol. Soc. Wash., xix, 138, 1906.
Wieomyia violescens Pazos, San. y Ben., ii, 51, 679, 1909.
Wyeomyia violescens Theobald, Mon. Culic., v, 623, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA VIOLESCENS:

Head black, a silvery spot on vertex; proboscis black; prothoracic lobes pearly violet; thorax bronzy brown, scales towards the margin more metallic; pleurae and coxae silvery; abdomen black with bluish reflection, silvery beneath; legs blackish, femora and tibiae pale beneath, middle pair with part of third, fourth and fifth tarsal joints pale above; hind pair with the tarsi laterally white at the bases of the joints.

8 specimens, Cayamas, Cuba, May and June (E. A. Schwarz).

Type.—Cat. No. 9991, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF WYEOMYIA VIOLESCENS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, distinctly swollen apically, vestiture black, with a bronzy and blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-seventh as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous, with a slight pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, brown, pruinose. Eyes separated at the vertex by a broad wedge produced anteriorly into a blunt point, bluish black. Occiput clothed with flat brown scales, with a metallic reflection, a small silvery-white spot at vertex, a white patch below, produced upward a distance along margins of eyes; two long setæ at vertex and shorter ones along margins of eyes.

Prothoracic lobes large, elliptical, distinctly separated, clothed with flat, pale, shining violaceous scales; a row of setæ anteriorly. Mesonotum clothed with

Digitized by Google

elliptical, flat brown scales, with a bronzy and blue reflection; scales on lateral margins whitish, a few pale scales in front; setæ at roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, rounded, dark brown, a group of small, pale setæ near posterior margin. Pleuræ luteous, brown in the middle, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white; colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; outstanding scales of veins broadly linear, black, with bronzy reflection on costa, broader and denser at extreme apex. Halteres whitish, with black knobs.

Legs rather long, slender, black with violaceous and blue reflection, femora and tibiæ whitish beneath; mid tarsi with apical half of second and all of third, fourth and fifth joints white beneath; hind tarsi whitish beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

The adults were captured by Mr. Schwarz as they came to bite in the daytime, some in the woods, some in the house.

Cuba.

Cayamas, May 8 and 30, March 3 and 9, June 3 and 8 (E. A. Schwarz); Santiago de Cuba, May 28, 1903 (J. R. Taylor). The species is also reported by Dr. J. H. Pazos from Daiquiri, under the name *Wyeomyia smithii*.

WYEOMYIA MITCHELLII (Theobald) Pazos.

Dendromyia mitchellii Theobald, Mosq. or Culic. of Jamaica, 37, 1905.
Wyeomyia ochrura Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 227, 229, 1906.
Wyeomyia ochrura Dyar & Knab, Proc. Biol. Soc. Wash., xix, 141, 1906.
Wyeomyia pertinans Dyar & Knab (in part), Proc. Biol. Soc. Wash., xix, 168, 1906.
Dendromyia mitchellii Theobald, Mon. Culic., iv, 605, 1907.
Wyeomyia mitchelli Pazos, Anal. Acad. de Cien. méd., fís. y nat. Habana, xlv, 429, 1908.
Wieomyia mitchelli Pazos, San. y Ben., ii, 51, 676, 1909.
Dendromyia mitchellii Theobald, Mon. Culic., v, 591, 1910.
Wyeomyia ochrura Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF DENDROMYIA MITCHELLII:

Head deep brown, with grey scales at the sides; proboscis and palpi deep brown; antennæ brown. Thorax deep shiny brown, clothed with deep brown scales; pleurae bright ochraceous, with patches of silvery white scales. Abdomen deep blackish, with grey or creamy venter; unbanded and unspotted; apex dark ventrally, with black bristles; legs long and thin, deep brown, except one side of the last three mid tarsi (and the tip of the fourth, which is black), and the apex of the first, which are shiny silvery white. Wings with brown scales; fork-cells long.

♀. Head deep brown, clothed with flat deep-brown scales, except around the eyes, where there is a broad border of grey scales showing violet reflections, and at the sides, and also a creamy patch in the middle in front; a few curved black bristles project forward over the eyes. Proboscis deep blackish brown, nearly as long as the abdomen, slightly swollen apically. Palpi deep blackish brown, with short black bristles, about one-eighth the length of the proboscis; antennæ deep brown, with long dark verticillate hairs and grey pubescence on the internodes. Eyes black (in the dead insect). Thorax deep shiny black, clothed with irregularly disposed, bronzy-black, flat, spindle-shaped scales and large, flat, spatulate ones with dull violet reflections over the roots of the wings, and deep brown bristles; there are also large, flat scales before the scutellum. A few grey scales in front over the head; prothoracic lobes clothed with small, flat, brown scales above, with dull silvery white ones below; a patch of small, flat, silvery-white scales on each

Digitized by Google

side of the mesonotum in front, scarcely showing in the dorsal view; scutellum testaceous, clothed with small, flat, dull brownish violet, spatulate scales and brown border-bristles; metanotum deep to bright brown according to the light, with a few chaetæ arising from black spots towards its apex; pleuræ ochraceous, with patches of small, white, flat scales.

Abdomen blackish, the scales showing dull violet reflections, border-bristles very small and pallid; venter entirely clothed with dull white scales and a few black ones apically, and with many straight black bristles at the apex.

Legs long and thin, deep blackish brown with bronzy reflections, the hind femora dilated apically, the last three mid tarsi and the apex of the first silvery white on one side, except just at the apex of the last segment; ungues small, equal and simple. Wings with brown scales, those on the apex of the two branches of the second long vein slightly broadened, some of the other lateral vein-scales long and rather thin, especially on the stem of the second and on the fourth; first submarginal cell considerably longer and a little narrower than the second posterior cell, its base nearer the base of the wing than that of the latter cell, its stem about one-third the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein longer than the mid cross-vein, about half its own length distant from it; mid and supernumerary cross-veins almost in a straight line. Halteres with pale ochraceous stem and fuscous knob.

Length.—4 mm.

Time of capture.—January (1904).

Habitat.—Jamaica.

Observations.—Described from a single perfect female taken by Dr. Grabham. It can at once be identified by the white mid tarsi. This appears to be on one side only, apparently the upper surface.

It can be at once told from the other species by the above character and the cephalic adornment. No special notes have been made on this insect. There are more lateral linear scales to the wings than in the type of the genus, but it more nearly approaches *Dendromyia* than *Wyeomyia*.

ORIGINAL DESCRIPTION OF WYEOMYIA OCHRURA:

The air tube is pale, with concolorous tip, with coarse single hairs. Pecten teeth of the comb of the eighth segment simple. Subventral tuft of the anal segment, large and stellate; lateral hair single. Abdominal hairs tufted. Mr. Busck collected the larva at San Domingo, in the leaf stalks of young palms; it was named "*Dendromyia* sp." by Mr. Coquillett. We have it also from Mr. Urich in Trinidad, named "*Phoniomyia longirostris* Theob." and from Surgeon W. Campbell in Dominica named "*Wyeomyia grayii* Theob." What it would have been named the next time it occurred, we do not know, as we propose to fix it now by a name of its own.

The following is an abstract of the table:

1.	Anal processes equally developed	3
3.	Lateral comb of the eighth segment of many teeth in a long line	4
4.	Comb a long row of single teeth, nowhere doubled	5
5.	Tube with coarse single hairs, all pale	6
6.	Air tube 3½ × 1; spines of comb scales shorter than the base	*ochrura*

DESCRIPTION OF FEMALE, MALE AND LARVA OF WYEOMYIA MITCHELLII:

Female.—Proboscis moderate, swollen at tip, labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black, narrowly pale beneath nearly to tip. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with a slight pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, luteous brown, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with iridescent reflection, a small white spot at vertex, a patch below continued upward as a narrow border along half of the eyes; two long bristles at vertex and shorter setæ along the margins of eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat scales, bronzy violet, narrowly paler at tip; basal half silvery. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; a few scales on anterior margin and below lateral angles whitish; setæ over roots of wings dark

Digitized by Google

brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a broad, low median carina, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long dark-brown terminal setæ; dorsal vestiture black with a slight bronzy and blue reflection; venter yellowish white; colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell less than one-half as long as its cell; that of second posterior cell slightly shorter than its cell; basal cross-vein distant less than its own length from the anterior cross-vein; outstanding scales of veins ligulate, truncate at tip, black, with bronzy reflection on costa, those on forks of second vein and on apices of third and fourth veins broader and denser. Halteres whitish with black knobs.

Legs rather long and slender, black with a bronzy and blue reflection; femora whitish, tibiæ brassy beneath; tarsi with bronzy luster below; mid legs with apical portion of second, and all of third, fourth, and fifth tarsal joints white on outer side; hind tarsi with small white spots at bases of all the joints beneath; fore tarsi without white markings. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.7 mm.

Male.—Proboscis as in the female, with a bronzy shade beneath becoming silvery at base. Palpi much as in the female, very short. Antennæ as in the female, the hairs of the whorls somewhat longer and more abundant. Coloration as in the female. Wings slightly narrower than in the female, venation and vestiture much the same. Abdomen subcylindrical, expanded at tip, apex with numerous coarse, dark bristles. Middle legs normal, a yellowish-silvery shade beneath throughout, the outer side marked with white, as in the female; white marks on hind tarsi somewhat longer than in the female. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Genitalia (plate 4, fig. 20): Side-pieces over twice as long as wide, the tips conically tapered; basal lobes small, roundedly triangular, setose; three long setæ in a row; clasp-filament with slender stem, the tip expanded into a cup-shaped clasp of three lobes, the inner slender and smooth, the middle one broad, with truncate, excavated tip, and rows of setæ, the outer elliptical, setose on the margin. Harpes concave, the tip curved and obscurely toothed. Harpagones forming a basal cone, the unci another. Basal appendages small, each with two short stout setæ.

Larva, Stage IV (plate 88, fig. 279).—Head rounded, about as long as wide, posterior angles rounded, the sides nearly straight, front margin evenly arcuate. Antennæ cylindrical, smooth, a single hair at outer third; two short spines, two very short ones, and a digit at tip. Eyes small, round. Upper pair of dorsal head-hairs in fours, lower pair double. Mental plate wide and shallow, front margin arcuate; a long prominent central tooth and thirteen on each side, even and regular, the basal ones more deeply cut. Mandible quadrangular; a filament from a notch before tip; an outer row of long cilia from a collar; a row of branched filaments before outer margin; dentition of four teeth on a process, the first longest; a short notch before, a broad filament, and five slender ones within; process below remote, taking the place of the basal angle, widely but shortly bifid, with tufts of hair at tips of forks; a row of fine hairs between it and the dentition; a row of long hairs within; a row of long hairs at base. Maxilla elongate elliptical, divided by a suture; inner half with sharp spines along the margin and a median row of cilia; a row of very coarse, thick hairs at tip; outer

Digitized by Google

half with a minute filament next the suture and a long spine subapically, which exceeds the apical hairs. Palpus less than half as long as maxilla, with minute apical digits. Thorax rounded, moderate; hairs rather abundant. Abdomen slender; first two lateral tufts multiple, third to fifth double and long, sixth single. Air-tube moderate, tapered on outer half, four times as long as wide; hairs single, fine, scattered on both surfaces; texture smooth; no pecten. Lateral comb of eighth segment of many single spines in a long, straight band, nowhere doubled; single spine elliptical, conically tapered at tip, smooth. Anal segment about as long as wide, with a dorsal plate reaching well down the sides; dorsal tuft of two long hairs on each side; a single long lateral hair; subventral tuft large, stellate; no ventral brush. Anal gills moderate, equal.

The larvæ live in the water between the leaves of Bromeliaceæ and in similar locations. Mr. Busck found them in water in the leaf-sheaths of a young palm and in another case in an epiphytic bromeliad. Dr. Pazos collected the larvæ from a species of *Tillandsia* (Bromeliaceæ).

Santo Domingo, Jamaica, and Cuba.

Near Santo Domingo City, Santo Domingo, larvæ in leaf-sheaths of a young palm, August 17, 1905 (A. Busck); San Francisco Mountains, Santo Domingo, larvæ in a bromeliad growing on a tree, August 29, 1905 (A. Busck); Kingston, Jamaica (M. Grabham); Jamaica, February 17, 1904 (M. Grabham); banks of the river Ariguanabo, San Antonio de los Baños, Cuba, larvæ in leaves of a *Tillandsia* sp. (J. H. Pazos).

The name *mitchellii* was founded on a single adult from Jamaica; the name *ochrura* was given to larvæ from Santo Domingo, Trinidad, and Dominica. We have restricted the name *ochrura* to the specimens from Santo Domingo, the other larvæ, although similar, representing different species. Dyar and Knab referred to *ochrura* specimens from Salvador, Guatemala, Mexico, and southern Florida, and later placed the name as a synonym of *Wyeomyia pertinans;* but further study has revealed specific differences between all these forms. *Wyeomyia mitchellii* extends throughout the Greater Antilles, but does not reach the mainland, not even southern Florida. It is less localized than most other species of this genus, especially as compared with the species with silvery prothoracic lobes, which occupy the same region, and are not only different on every island, but represented by several species in Cuba.

WYEOMYIA ANTOINETTA Dyar & Knab.

Wyeomyia ochrura Dyar & Knab (in part), Proc. Biol. Soc. Wash., xix, 141, 1906.
Wyeomyia antoinetta Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 263, 1909.
Wieomyia antoinetta Pazos, San. y Ben., ii, 51, 679, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA ANTOINETTA:

Proboscis moderate, distinctly swollen at the apex. Occiput dark-scaled, obscurely iridescent, the margin of the eyes not white-scaled, a silvery spot on the occiput and on sides below. Prothoracic lobes dark-scaled, with a violaceous luster, the apex and base silvery-scaled. Abdomen dark-scaled above with obscure bronzy and blue luster, white-scaled beneath, the colors separated on the sides in a straight line. Legs dark-scaled with a paler bronzy luster beneath, mid tarsi with the outer half of the second and all of the last three joints silver-white-scaled outwardly, hind tarsi unmarked. Wing-scales narrow. Length, 3 mm.

One specimen, Estero, Florida (J. B. Van Duzee), bred from larvæ in bromeliaceous plants.

Type no. 12179, U. S. N. M.

DESCRIPTION OF MALE AND LARVA OF WYEOMYIA ANTOINETTA (FEMALE UNKNOWN):

Male.—Proboscis moderate, swollen apically, labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black, a paler shade below, silvery basally. Palpi short, flattened, one-seventh as long as proboscis, bronzy black.

Digitized by Google

Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, yellowish brown, with a whitish pruinosity; hairs of whorls long, rather abundant, black. Clypeus rounded, convex, luteous, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a small white spot at vertex and a silvery patch below; two long setæ at vertex and shorter ones behind margins of eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat scales, shiny, bronzy violaceous, white at tip and base; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with submetallic reflection; scales on anterior margin and lateral angles whitish; setæ at roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a low, broad median carina, brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, expanded towards tip, with many long, dark-brown terminal setæ; dorsal vestiture black with a slight bronzy and blue reflection; venter yellowish white, the colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell less than one-half as long as its cell; that of second posterior cell as long as its cell; basal cross-vein distant less than its own length from anterior cross-vein; outstanding scales of veins broadly linear, black, with bronzy reflection on costa, denser and broader apically. Halteres whitish with black knobs.

Legs rather long and slender, black with a bronzy and blue reflection; femora whitish beneath, tibiæ and tarsi with pale-brassy luster beneath; mid tarsi with apical half of second, and all of third, fourth, and fifth joints white on outer side. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.3 mm.

Genitalia (plate 4, fig. 18): Side-pieces narrow elongate, tips conically tapered; basal lobes rounded triangular, setose; three long setæ in a row; clasp-filament with slender stem, the tip expanded into a cup-shaped clasp with three lobes; inner lobe slender and smooth; middle lobe broad, with truncate excavate tip with rows of setæ; outer lobe elliptical. Harpes curved, forming a cone, the harpagones and unci forming similar smaller cones. Basal appendages small, each with two setæ.

Larva, Stage IV (see figure of entire larva, plate 45).—Head rounded, with an angle on each side behind the eyes; antennæ small, with a minute hair-tuft beyond the middle; head-hairs short, multiple tufts; eyes very small. Thorax transverse, rounded subrectangular, mesothorax slightly protuberant laterally, lateral hairs very long, abundant, dorsal ones in short stellate tufts. Abdomen elongate, submoniliform, the segments slightly longer posteriorly, equal in diameter, lateral hairs on the first and second segments in fours and threes, double on segments three to six, single on seventh segment; subdorsal and subventral hairs in short stellate tufts, the subdorsal hairs in two tufts on each segment. Air-tube about five times as long as wide, subfusiform, the tip small and bearing a pair of slightly curved spines dorsally, the surface covered with rather numerous single hairs uniformly distributed, only the most apical ones shortened and doubled. Lateral comb of eighth segment a long, uniform row of closely set teeth, nowhere doubled, becoming smaller ventrally; hair-tuft posteriorly to comb of two long hairs. Anal segment about as long as wide, with a somewhat angled dorsal plate; dorsal tuft of two long hairs on each side, lateral tuft at angle of plate of a single long hair; subventral tuft a tuft of short stellate hairs. Anal gills rather short, equal, broadly ensiform, showing fine branching tracheæ.

Digitized by Google

The larvæ were obtained in the water between the leaves of epiphytic bromeliads, together with *Wyeomyia vanduzeei*. The habits of these two species were not differentiated, and are probably very similar. The *Wyeomyia antoinetta* were present in very small numbers, the *Wyeomyia vanduzeei* being common.

Southern Florida and Cuba.

Estero, Florida, larva pupated May 4, issued May 10, 1906 (J. B. Van Duzee); San Antonio de los Baños, Cuba (J. H. Pazos).

The species was founded on a single adult specimen. On first examination we referred it to *Wyeomyia mitchellii*, which it closely resembles, but we do not find, on close inspection, the small white marks at the bases of the hind tarsal joints beneath, which are present in all our *Wyeomyia mitchellii*, and are therefore forced to consider it a distinct species.

Lately Dr. J. H. Pazos has sent three specimens from Cuba which appear to agree entirely with the type from Florida. It seems probable, therefore, that the species is a good one.

WYEOMYIA PHILOPHONE (Dyar & Knab).

Phoniomyia philophone Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 209, 1907.
Phoniomyia philophone Busck, Smiths. Misc. Colls., quart. iss., iii, 75, 1908.
Phoniomyia philophone Theobald, Mon. Culic., v, 579, 1910.

ORIGINAL DESCRIPTION OF PHONIOMYIA PHILOPHONE:

Proboscis long and slender, nearly as long as the body, very slightly enlarged towards the apex; clypeus prominent, pitchy brown, covered with fine gray pubescence; tori of the antennæ black with fine silvery pubescence; occiput behind the eyes broadly silver scaled; palpi very short, black; vertex with green and blue iridescent scales; antennal segments long, the whorls of hairs consist of a few long ones, and being well removed from each other do not give a densely plumose appearance; prothoracic lobes large, prominent, collar-like, closely approximate but not contiguous, clothed with violet and blue metallic scales and with many coarse bristles on the front margin; mesonotum rather short, stout, clothed with dark olivaceous and green scales; metanotum short, globose, with two longitudinal impressions, pitchy brown, a group of setæ beyond the middle; abdomen long and slender, compressed, clothed above with blackish scales with an obscure greenish luster, beneath with white scales, divided on the sides in a straight line; legs long and slender, dark brown with bronzy luster, a whitish reflection on the front tarsi. Length, 3 mm.

Twenty specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in leaves of Bromelias.

***Type.*—No. 10852, U. S. National Museum.**

DESCRIPTION OF FEMALE, MALE AND LARVA OF WYEOMYIA PHILOPHONE:

Female.—Proboscis long and slender, uniform, labellæ conically tapered, with fine outstanding setæ; vestiture black, with a blue reflection. Palpi small, one-sixth as long as proboscis, clothed with black scales and rather long, fine setæ. Clypeus rounded triangular, dark brown, pruinose. Antennæ moderate, the joints subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, slightly pruinose; hairs of whorls sparse, long, black. Eyes black. Occiput broad, clothed with flat, appressed scales, black with blue and green reflection; a violaceous vertical patch, silvery white in some lights, a silvery-white patch at the sides below.

Prothoracic lobes large, well separated dorsally, brown, clothed with shining submetallic violaceous and blue scales, a row of setæ on anterior margin. Mesonotum black, clothed with elliptical, flat scales, dull greenish and bronzy metallic in color; bristles at roots of wings short. Scutellum trilobate, similarly clothed to mesonotum, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, dark brown, a tuft of small setæ posteriorly. Pleuræ dark brown, coxæ luteous, clothed with elliptical silvery-white scales.

Abdomen subcylindrical, tip blunt, with small terminal setæ; dorsal vestiture

Digitized by Google

black with a slight submetallic-blue reflection; venter silvery-white; colors separated on sides in a nearly straight line.

Wings moderate, hyaline; petiole of second marginal cell half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins broadly linear, brown with a bronzy reflection, denser and slightly broader on forks of second vein and apices of third and fourth. Halteres largely blackish.

Legs slender, black with a blue reflection, trochanters silvery white beneath, femora whitish beneath; tibiæ and tarsi with a bronzy luster beneath; mid tarsi, with apex of second, all of third to fifth joints white-marked beneath; fore and mid tarsi without white markings.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Abdomen somewhat expanded towards apex, the tip with numerous coarse brown bristles. Antennæ scarcely distinguishable from those of the female. Coloration as in the female, the middle legs with a strong brassy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Genitalia (plate 3, fig. 15): Side-pieces over twice as long as wide, much tapering to the tips; basal lobes narrowly triangular, setose; three long setæ in a row. Clasp-filament stout, swollen beyond the base, tip expanded into three lobes, the inner one long and slender, the middle one broad, conical, with hooked tip and a row of setæ, outer one curved and slender. Harpes slender, concave, tips curved and obscurely toothed. Harpagones forming a broad cone. Unci forming a similar but smaller cone. Basal appendages small, each with two short, stiff setæ.

Larva, Stage IV (plate 87, fig. 274).—Head rounded, with slight angles behind eyes; antennæ small, slender, a small two-haired tuft beyond the middle; upper pair of dorsal head-hairs three-haired, lower two-haired and long. Lateral abdominal hairs on third to seventh segments single. Air-tube over six times as long as wide, gently tapered, more rapidly so at terminal fifth, with evenly distributed single hairs, those nearest the base double or triple and shorter; terminal hooks small, straight. Comb of eighth segment of rather long single spines in a dense row, becoming smaller ventrally; the hair behind the comb single. Anal segment somewhat longer than wide, with a large dorsal plate; dorsal tuft of two long hairs on each side; lateral hair at angle of plate single; subventral tuft large, multiple, short. Anal gills equal, over twice as long as anal segment, broadly ensiform.

Mr. Busck collected the larvæ in two instances in water between the leaves of epiphytic bromeliads, *Tillandsia* sp., in a native village near Tabernilla. They were associated with *Wyeomyia circumcincta, Culex jenningsi,* and *Orthopodomyia phyllozoa.* Mr. Jennings also collected the larvæ in similar locations at Gatun and Porto Bello.

Panama.

Tabernilla, Canal Zone, larvæ in leaves of bromelias, January 25, 1907, July 10, 1907 (A. Busck); Gatun, Canal Zone, larvæ in a bromelia in a swamp, August 11, 1908 (A. H. Jennings); Porto Bello, from a bromelia near the alcalde's ranch, March 16, 1909 (A. H. Jennings).

WYEOMYIA MELANOCEPHALA Dyar & Knab.

Wyeomyia melanocephala **Dyar & Knab, Proc. Biol. Soc. Wash., xix, 140, 1906.**
Wyeomyia melanocephala **Theobald, Mon. Culic., v, 624, 1910.**

ORIGINAL DESCRIPTION OF WYEOMYIA MELANOCEPHALA:

Prothoracic lobes entirely dark bluish; head dark behind, without white margin to the eyes; hind feet with the last two tarsal joints white.

One specimen, Trinidad, B. W. I. (A. Busck).

***Type.*—Cat. No. 9998, U. S. Nat. Mus.**

Digitized by Google

DESCRIPTION OF FEMALE OF WYEOMYIA MELANOCEPHALA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather short, swollen apically; vestiture black with a blue reflection, bronzy beneath; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish, with a slight pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, blackish, slightly pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat black scales with a blue reflection, a silvery patch below; two setæ at vertex and smaller ones along margin of the eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat shining blue and violaceous scales, a row of setæ along anterior margin. Mesonotum clothed with elliptical flat dark-brown scales with a bronzy and blue reflection; scales on lateral angles bronzy; setæ on roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter metallic yellowish white, colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins dense, broadly ovate or rounded triangular, black, with blue reflection on the costa. Halteres whitish with black knobs.

Legs rather long and slender, black with a bronzy and blue reflection, femora pale brassy beneath, tibiæ and tarsi with a bright bronzy luster beneath, strongest on middle legs; mid tarsi with the apical third of the second and all of the third, fourth, and fifth joints white on outer side, beneath also on last two joints; hind legs with last two joints white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.5 mm.

Life history and habits unknown.

Trinidad, British West Indies.

Trinidad, June, 1905, a single adult specimen captured (A. Busck).

We know this species only in the single example from Trinidad. The specimen recorded by Mr. Busck from the Canal Zone (Smiths. Misc. Colls., quart. iss., lii, 73, 1908) proves on reëxamination to have been wrongly identified, and to be in fact a specimen of *Wyeomyia canfieldi*.

WYEOMYIA PANDORA Dyar & Knab.

Wyeomyia pandora Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 261, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA PANDORA:

Proboscis moderate, bronzy black. Occiput black with bronzy and blue reflection without white margin to the eyes. Prothoracic lobes dark metallic blue with violet and coppery luster. Abdomen with the colors separated on the sides in a straight line, silvery beneath. Wing-scales broad, ovate, many obliquely subtruncate; legs bronzy black, mid tarsi with the apical two-thirds of the second and all the succeeding joints silvery white on the outer side; hind tarsi with the last two joints white all around. Length, 3.5 mm.

Four specimens, Corozal, Canal Zone, Panama, bred from larvæ in *Calladium* leaf-axils (A. H. Jennings); Gorgona, Canal Zone, Panama, bred from larvæ (A. H. Jennings); Black Swamp, Canal Zone, Panama, from larvæ (A. H. Jennings).

Type no. 12132, U. S. N. M.

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA PANDORA:

Female.—Proboscis moderate, swollen apically, vestiture black, with a bronzy and blue reflection, slightly paler beneath; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-fifth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish, with slight pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, elongate, blackish, slightly pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat black scales with bronzy and blue reflection, a silvery patch below; two setæ at vertex and smaller ones along margin of eyes.

Prothoracic lobes large, distinctly separated, clothed with flat, shining blue and violaceous scales with a coppery reflection in some lights and a silvery patch at base; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat, dark-brown scales, with bronzy and blue reflection; scales below lateral angles bronzy; setæ over the roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a small group of setæ near the posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long dark-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter silvery white, the scales somewhat raised along the mid-ventral line; colors separated on sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein close to anterior cross-vein; scales of veins dense, broadly ovate or rounded triangular, black, with a blue reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflection, the femora pale brassy beneath; tibiæ and tarsi pale bronzy beneath; mid tarsi with apical three-fourths of the second and all of the succeeding joints white on outer side; hind tarsi with last two joints silvery white all around. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Proboscis longer and more slender than in female. Palpi slender, one-sixth as long as proboscis. Antennæ similar to those of the female, the joints with small secondary subapical whorls, basal whorls longer and more abundant than in the female. Coloration similar to the female. Abdomen subcylindrical, somewhat compressed, somewhat expanded at tip, with abundant terminal setæ, claspers visible from above. Wings with petiole of second posterior cell about half as long as its cell, cross-veins nearly incident, vestiture as in the female. Front and mid legs with a pale-brassy luster beneath, the mid legs with the last four tarsal joints silvery white on outer side; hind legs bronzy beneath, the last two joints silvery all round; mid tarsi with a single long, strongly curved claw, claws of hind tarsi slightly unequal; formula, 0.0–0–0.0.

Length: Body about 3.3 mm.; wing 3 mm.

Genitalia (plate 3, fig. 11): Side-pieces over twice as long as wide, the tip much tapered; three long setæ in a row. Clasp-filament with slender stem, the tip roundedly expanded, a slender lobe at base of expansion and two outer on it, one slender and hooked, the other broad and with coarse short spines; many setæ on the expansion. Harpes elliptical, concave, the margin thickened, tip curved and pointed. Harpagones forming a basal cone. Unci forming a similar smaller cone. Basal appendages small, each with two or three short, stiff setæ.

Digitized by Google

Larva, Stage IV (plate 87, fig. 275).—Head rounded, posterior angles slight; antennæ moderate, smooth, uniform; dorsal head-hairs single. Lateral hairs of abdomen multiple on first two segments, double on third, single on the rest. Comb of eighth segment of about nine separate teeth in a single row. Air-tube straight, slightly tapered, about six times as long as wide, a row of single hairs on dorsal aspect, a few on posterior aspect, and a dense fringe of long, fine hairs along ventral line nearly to tip; a few terminal hairs, the hooks stout. Anal segment longer than wide, dorsal plate large; dorsal tuft of three hairs on each side, lateral hair single, subventral tuft of two long hairs and attached to dorsal plate. Anal gills subequal, over twice as long as the segment.

The larvæ live in the fluid in the leaf-axils of *Calladium* and similar locations.

Panama.

Corozal, Canal Zone, November 30, 1907, larvæ from *Calladium* leaf-axils in a Chinaman's garden (A. H. Jennings); Gorgona, Canal Zone, February 7, 1908, larvæ from "banana bromelia" near the Carabali River (A. H. Jennings); Black Swamp, near Lion Hill, Canal Zone, July 28, 1908, larvæ in a liliaceous plant growing through the scum (A. H. Jennings); Tabernilla, Canal Zone, February 4, 1909, larvæ in flowers of *Heliconia* (L. Espey).

WYEOMYIA CANFIELDI (Dyar & Knab).

Sabethes canfieldi Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 207, 1907.
Sabethes canfieldi Busck, Smiths. Misc. Colls., quart. iss., lii, 71, 1908.
Wyeomyia melanocephala Busck (not Dyar & Knab), Smiths. Misc. Colls., quart. iss., lii, 73, 1908.
Sabethes* (?) *canfieldi Theobald, Mon. Culic., v, 585, 622, 1910.

ORIGINAL DESCRIPTION OF SABETHES CANFIELDI:

♀.—Proboscis shorter than the body, strongly swollen at the apex, black; clypeus prominent, smooth, shining black; tori of the antennæ black with a whitish pubescence; occiput clothed with flat dull metallic-green scales; prothoracic lobes approximated, clothed with brilliant blue and violet scales; mesonotum clothed with dark greenish scales; scales of the scutellum metallic green and blue; metanotum deep brown, with a number of long pale bristles; abdomen dark above, with greenish-blue luster, silvery white beneath, separated on the sides in a perfectly straight line; legs long and slender, without raised scales, black, with light bronzy reflections beneath in certain lights, the tarsi of the middle legs white on the second to fifth joints, the white becoming obscure on the basal part of the second segment, on the hind legs the last two joints white. Length, 3.5 mm.

Twenty-three specimens, Lion Hill, Canal Zone, Panama (August Busck, collector), all captured.

Type.—No. 10850, U. S. National Museum.

Named, at the suggestion of Mr. Busck, in honor of Dr. Herman Canfield, Assistant Chief Sanitary Inspector of the Canal Zone.

DESCRIPTION OF FEMALE AND LARVA OF WYEOMYIA CANFIELDI (MALE UNKNOWN):

Female.—Proboscis moderate, slightly swollen apically; vestiture black, coarse; labellæ small, rounded with fine outstanding setæ. Palpi short, one-fifth as long as proboscis, slender, black, a tuft of outstanding hairs at base. Antennæ moderate, the joints subequal, rugose, coarsely pilose, black, the articulations white; tori subspherical, with a cup-shaped apical excavation, dark brown, whitish pruinose; hairs of whorls long, moderately dense, black. Clypeus narrow, elliptical, convex, dark brown with a white pruinosity, nude. Eyes large, separated at the vertex by a narrow wedge, black. Occiput clothed with flat, dull metallic-green scales, silvery white on lower part of sides, two brown setæ at vertex.

Prothoracic lobes large, approximate dorsally, clothed with metallic blue and violaceous scales and bearing a dense row of black bristles. Mesonotum blackish densely clothed with flat, bluish-black, narrowly ovate scales, with a green and brown reflection, brighter posteriorly and over roots of wings. Scutellum trilob-

Digitized by Google

ate, densely covered with scales similarly to those of posterior end of mesonotum, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, dark brown, with a rounded median carina, a tuft of about ten large bristles posteriorly. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales, a large patch of brownish ones behind the prothoracic lobe.

Abdomen subcylindrical, truncate at the tip, which bears many black hairs; dorsal vestiture black, with faint greenish reflection; first segment with blue-green luster and with pale bristles; venter pale golden, the colors separated on the sides in a sharp, straight line; scales raised along medioventral line.

Wings moderate, hyaline, iridescent; petiole of second marginal cell one-third as long as cell, that of second posterior cell much shorter than its cell; cross-veins nearly incident; scales of veins black, with a bronzy green reflection, elliptical, many obliquely subtruncate, those on second vein larger and denser. Halteres blackish, except at the base.

Legs slender, the vestiture black with a blue and violaceous reflection; femora and tibiæ, except tip of latter, brassy beneath; last tarsal joint of the mid legs and last two of the hind legs white on under side. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Larva, Stage IV (plate 87, fig. 276).—Head rounded anteriorly, posterior angles slight; antennæ moderate, smooth, uniform; dorsal head-hairs all single. Lateral hairs of abdomen multiple on first two segments, double on third, single on the rest. Comb of eighth segment of about nine separate teeth in a single row. Air-tube straight, slightly tapered, about five times as long as wide, a row of single hairs on dorsal aspect, a few on posterior aspect, and a dense fringe of long, fine hairs along posterior line nearly to tip; a few terminal hairs, the hooks stout. Anal segment as long as wide, dorsal plate large; dorsal tuft of three long hairs on each side, lateral hair single, subventral tuft of two long hairs and attached to dorsal plate. Anal gills subequal, stout, more than twice as long as the segment.

The natural breeding-places of the species are unknown. Mr. Busck took a single larva, about which he says:

"A single larva taken, together with *Culex* and *Anopheles* larvæ, in a nearly quiet pool of a slow-running, cold, clear brook in the mountains back of Empire. This is a very unusual breeding-place for a larva of this genus, and it is probable that this single larva had been washed out by a rainstorm from a *Tillandsia* on an overhanging branch or from an overflowing tree-hole or bamboo-joint."

Mr. Busck informs us that there had been heavy rains just preceding his discovery of the larva, and that to both himself and Mr. Jennings, who accompanied him, the discovery of the larva seemed unusual and it looked to be out of place. The adults were taken commonly at Lion Hill, where they came to bite in the daytime. Mr. Busck reports that they bit viciously. He says:

"This was the common mosquito in the Black Swamp from Ahorca Lagarto to Gatun, and came in numbers whenever one stepped into the shade of the brush. I was not able to locate its larvæ."

Panama.

Lion Hill, Canal Zone, 64 specimens caught in the act of biting (A. Busck); bred from a single larva taken in a quiet pool in a brook near Empire, Canal Zone, May 7, 1907 (A. Busck); Tabernilla and Gatun, Canal Zone, 1909 (A. H. Jennings).

This species was first described as a *Sabethes*, the eyes appearing to be contiguous at the vertex. A close inspection shows that they are really separated by a narrow wedge, although they are considerably invaginated in the type specimen. We are therefore enabled to correct the generic location. The species is

Digitized by Google

unusually large and conspicuous for a *Wyeomyia*. The species, along with some others, also approaches *Sabethes* in the venation of the wings and in the larger and more closely approximated prothoracic lobes. We find, however, that these species are connected with typical *Wyeomyia* by intergrading species. *W. canfieldi* seems to be remarkably abundant where it occurs, and must possess unusual breeding habits, since only a single larva has been discovered, and that by accident in an evidently abnormal situation.

WYEOMYIA HOMOTHE Dyar & Knab.

Wyeomyia homothe Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 211, 1907.
Wyeomyia homothe Busck, Smiths. Misc. Colls., quart. iss., lii, 74, 1908.
Wyeomyia homothe Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA HOMOTHE:

Proboscis long and slender, distinctly swollen at the apex; palpi very short, dark scaled, a few light scales at the tip; clypeus and tori light brown with fine grayish pubescence; wedge between the eyes broad, silvery scaled; occiput entirely dark scaled, the eyes without margin of light scales; prothoracic lobes large and prominent, well separated, clothed with brown scales with violet reflection, the apices broadly silvery as also the base below; mesonotum clothed with dull-brown scales, the setæ of the scutellum brown; metanotum pitchy brown, with a group of setæ towards the apex; abdomen compressed, black scaled above with greenish luster, extending well down the sides, the venter narrowly creamy-white scaled; legs long and slender, dark with bronzy luster, the mid legs with the third, fourth and fifth tarsal joints marked with white on the inner side, rather indistinct and only clearly visible in certain lights; scales of the wing-veins long and narrow. Length, 3 mm.

One specimen, Tabernilla, Canal Zone, Panama (August Busck, collector), captured in bamboo woods.

Type.—No. 10859, U. S. National Museum.

DESCRIPTION OF FEMALE OF WYEOMYIA HOMOTHE (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long and slender, swollen apically, bronzy black; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-seventh as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a small white patch below; two setæ on the vertex and smaller ones behind the margin of the eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat scales, violaceous with bronzy reflection, a pale tip. Mesonotum clothed with elliptical, flat dark-brown scales with a submetallic reflection; scales on front margin and lateral angles whitish; bristles at roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a low median carina, dark brown, a group of small setæ on posterior angle. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many dark-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter yellowish white, the colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins narrowly cuneiform, black, with bronzy reflection on costa, broader and denser towards apex of wing. Halteres whitish with black knobs.

Legs rather long and slender, black with a violaceous and bronzy reflection, the femora whitish beneath; tibiæ and tarsi with bronzy luster beneath; mid

Digitized by Google

tarsi with apical three-fourths of third and all of fourth joints white beneath; hind tarsi with basal two-thirds of fifth joint silvery white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 2.8 mm.

Mr. Busck says: "The adults were taken in bamboo woods in the act of biting," flying in the daytime.

Panama.

Tabernilla, Canal Zone, adult captured (A. Busck).

WYEOMYIA CLASOLEUCA Dyar & Knab.

Wyeomyia clasoleuca Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 68, 1908.
Wyeomyia clasoleuca Theobald, Mon. Culic., v, 626, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA CLASOLEUCA:

Female.—Proboscis moderately long and slender, the apical third much swollen, black-scaled; palpi black-scaled; occiput dark-scaled, without light margin to the eyes; prothoracic lobes dark metallic blue-scaled with purple reflection, the apices without lighter scales; mesonotum dark dull brown-scaled, nearly black; abdomen dark-scaled above, with obscure bronzy and bluish reflections, beneath silvery white-scaled, the colors separated on the sides in a straight line; legs dark-scaled, with bronzy and blue reflection; on the hind legs the fourth tarsal joint is silvery white-marked beneath from the base nearly to the apex, the fifth tarsal joint silvery white-marked beneath throughout; fore and mid tarsi entirely dark. Length, 3.5 mm.

Two specimens, Caldera Island, Porto Bello Bay, Panama. (A. H. Jennings.)

Type.—Cat. No. 11990, U. S. N. M.

DESCRIPTION OF FEMALE OF WYEOMYIA CLASOLEUCA (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, the tip expanded, the labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black, brighter bronzy beneath. Palpi short, flattened, one-fifth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, with a white pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, blackish, whitish pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat dark-brown scales with a blue reflection, a large white spot at lower part of sides; two setæ at vertex and smaller ones along margins of the eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat dark metallic blue and violaceous scales; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue reflection; scales of front margin pale shiny, those below lateral angles bronzy iridescent; bristles over wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, truncate apically, and with many long light-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter yellowish white, the colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant nearly its own length from anterior cross-vein; scales of veins dense, short, broadly ovate, mostly obliquely subtruncate, black, with a slight bronzy reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black, with a bronzy reflection, the femora whitish beneath; tibiæ and tarsi with a brighter bronzy luster beneath; hind

Digitized by Google

tarsi with basal three-fourths of fourth and fifth joints broadly white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Life history and habits unknown.

Caldera Island, Caribbean coast of Panama.

Porto Bello Bay, adults captured (A. H. Jennings).

WYEOMYIA MATÆA Dyar & Knab.

Wyeomyia matæa Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 70, 1908.
Wyeomyia malaea Theobald, Mon. Culic., v, 626, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA MATÆA:

Female.—Proboscis long and slender, swollen at the apex, dark-scaled, with a line of whitish scales on the under surface; palpi dark-scaled; occiput dark-scaled, with faint bluish and bronzy reflections, the margin of the eyes dull white-scaled, interrupted on each side of the vertex; prothoracic lobes dark blue and violaceous, with strong iridescence; mesonotum dark bronzy brown-scaled; abdomen above blackish brown-scaled, with obscure bronzy and blue reflections, beneath coarsely white-scaled, the colors separated on the sides in a straight line; legs dark-scaled, with bronzy and blue reflection, the under surfaces of the femora and tibiæ pale brassy-scaled; mid-legs with the apical half of the second joint and all of the third, fourth, and fifth silvery white-marked on one side; front and hind tarsi unmarked. Length, 3.5 mm.

Two specimens, Sonsonate, Salvador, August 19, 1905, and Santa Lucrecia, State of Vera Cruz, Mexico, June 21, 1905. (F. Knab.)

Type.—Cat. No. 11994, U. S. N. M.

DESCRIPTION OF FEMALE AND MALE OF WYEOMYIA MATÆA (LARVA UNKNOWN):

Female.—Proboscis rather slender, the tip somewhat expanded, the labellæ small, rounded, with fine outstanding setæ; vestiture bluish black, pale bronzy beneath. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with a whitish pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded truncate in front, convex, brown pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a bronzy and blue reflection, a small metallic spot at the vertex and a large white spot at lower part of sides; a narrow white margin running up along the sides of the eyes, not attaining the vertex; two setæ at vertex and smaller ones along margins of the eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat blackish scales with violet-blue luster, a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales below the lateral angles silvery gray; bristles over roots of wings dark brown. Scutellum trilobate, with the vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long, dark-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter yellowish white, colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein incident with anterior cross-vein; scales of veins long, narrowly ligulate, black, with a slight bronzy reflection on costa, broader and denser on forks of second and fourth veins and outer half of third. Halteres whitish with black knobs.

Legs rather long and slender, black, with a bronzy reflection, femora whitish beneath; tibiæ and tarsi with a strong bronzy luster beneath; middle tarsi with

Digitized by Google

the outer third of second and all of the third and fourth joints white on outer side. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.2 mm.

Male.—Proboscis long and slender, tip hardly expanded. Palpi short, one-seventh as long as proboscis. Antennæ similar to those of the female, the joints subequal, the hairs of the whorls longer than in the female, with small secondary subapical whorls on the joints. Coloration as in the female. Abdomen elongate, subcylindrical, expanded towards tip, with many coarse terminal bristles. Legs colored as in the female. Wings slightly narrower than in the female, the venation similar. Mid tarsi with a single large claw; claw formula, 0.0–0.–0.0.

Length: Body about 3.5 mm.; wing 3.2 mm.

Genitalia (plate 4, fig. 17): Side-pieces conical, the tips slenderly tapered and bent downward. Three long setæ near the base. Clasp-filament with a short, stout stem which has a constriction on one side near the base, tip expanded and divided into three lobes; mid lobe short, rounded, smooth; inner lobe slender, smooth, bent, its tip divided into two digits; outer lobe expanded, long, elliptical, bearing a row of spines and crested by a small triangular expansion. Harpes small, narrow, the tips bent and dentate. Unci inconspicuous. Basal appendages of two stout spines on each side.

Mr. Jennings bred the species from larvæ in bromelias on a fallen tree, but unfortunately made no isolations. The adults fly by day.

Panama to southern Mexico.

Sonsonate, Salvador, August 19, 1905, adult captured (F. Knab); Santa Lucrecia, State of Vera Cruz, Mexico, June 21, 1905, adult captured (F. Knab); Empire, Canal Zone, Panama, March 2, 1909, larvæ in bromelias (A. H. Jennings).

WYEOMYIA SMITHII (Coquillett) Felt.

Culex pungens Smith (not Wiedemann), in Howard, Mosq., 83–90, 1901.
Aëdes fuscus Howard (not Osten Sacken), Mosquitoes, 153, 1901.
——— ——— Smith, Ent. News, xii, 93, 125, 1901.
Culex pungens Smith (not Wiedemann), Ent. News, xii, 153, 1901.
Aëdes fuscus and *Aëdes sapphirinus* Smith (not Osten Sacken), Ent. News, xii, 189, 220, 1901.
Aëdes smithii Coquillett, Can. Ent., xxxiii, 260, 1901.
Aëdes smithii Smith (in part), Ent. News, xii, 254, 1901.
Aëdes smithii Dyar, Journ. N. Y. Ent. Soc., ix, 178, 1901.
Aëdes smithii Smith, Journ. N. Y. Ent. Soc., x, 10, 1902.
Aëdes smithii Dyar, Proc. Ent. Soc. Wash., v, 51, 1902.
Aëdes smithii Johannsen, Bull. 68, N. Y. State Mus., 425, 1903.
Aëdes (Verrallina ?) smithii Theobald, Mon. Culic., iii, 295, 1903.
Aëdes smithii Felt, Bull. 79, N. Y. State Mus., 341, 1904.
Wyeomyia smithii Felt, Bull. 79, N. Y. State Mus., 391e, 1904.
Wyeomyia smithii Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 342, 1905.
Aëdes smithi Blanchard, Les Moustiques, 403, 1905.
Wyeomyia smithii Dyar, Journ. N. Y. Ent. Soc., xiii, 23, 53, 1905.
Wyeomyia smithii Mitchell, Can. Ent., xxxvii, 332, 1905.
Wyeomyia smithii Felt, Bull. 97, N. Y. State Mus., 446, 493, 1905.
Wyeomyia smithii Knab, Journ. N. Y. Ent. Soc., xiii, 69, 1905.
Wyeomyia smithii Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 227, 1906.
Wyeomyia smithii Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 27, 1906.
Wyeomyia smithii Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 1, 1906.
——— ——— Jarvis, Can. Ent., xxxviii, 7, 1906.
Dendromyia smithii Theobald, Mon. Culic., iv, 608, 1907.
Dendromyia smithi Peryassú (in part), Os Culic. do Brazil, 56, 309, 1908.
Wyeomyia smithii Viereck, 1st Ann. Rept. Comm. Health Pa., 471, 1908.
Dendromyia smithii Theobald (in part), Mon. Culic., v, 588, 1910.
Wyeomyia smithii Morse, Ann. Rept. N. J. State Mus., 1909, 721, 1910.

Digitized by Google

ORIGINAL DESCRIPTION OF AËDES SMITHII:

Black, the pleura largely, venter, bases of halteres, coxæ, and bases of femora yellow, scales of upper sides of body dark brown, some on the abdomen having a violaceous reflection, scales of the femora black, those on the under side light yellow, scales of hind tibiæ black, those on the inner side and on the front and middle tibiæ and their tarsi light yellow, tarsal claws simple; wings hyaline, first submarginal cell nearly twice as long as its petiole; length 3 mm. Two males and three females bred from material received from Prof. J. B. Smith, after whom the species is named. Type No. 5799, U. S. National Museum.

Habitat.—Lahaway, New Jersey.

At the suggestion of the writer, Prof. Smith submitted specimens of this species to Mr. Samuel Henshaw, of the Museum of Comp. Zoology at Cambridge, Mass., for comparison with the type of *Aëdes fuscus*, and Mr. Henshaw replied that the two forms are very distinct. The new species will readily be recognized by the absence of cross-bands of yellowish scales at the bases of the abdominal segments.

DESCRIPTION OF FEMALE, MALE, LARVA, AND PUPA OF WYEOMYIA SMITHII:

Female.—Proboscis moderate, swollen apically; vestiture black, with a bronzy-blue reflection, brighter bronzy beneath; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one sixth as long as the proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, black, with a whitish pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded, convex, black, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a small silvery spot at the vertex, a white patch below running up a short distance on the eye margin; two long setæ at the vertex and a row of shorter ones along margins of eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat violet-blue scales with metallic reflection; a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with a pale bronzy reflection; scales below anterior angles yellowish silvery; bristles over roots of wings black. Scutellum trilobate, with vestiture similar to and continuous with that of the mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, the coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many coarse, long, dark-brown terminal setæ; dorsal vestiture black with a strong bronzy and blue reflection; venter silvery white, colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant its own length from anterior cross-vein; outstanding scales of veins ligulate, black, with bronzy reflection on costa, broader and denser on forks of second and fourth veins and outwardly on third vein. Halteres whitish with black knobs.

Legs moderately long and slender; vestiture black with bronzy and blue reflection, all the legs pale bronzy beneath throughout, the femora whitish towards base; mid tarsi with the apical portion of the second joint and all of the third and fourth joints white on the outer side. Claw formula, 0.0–0.0–0.0.

Male.—Proboscis as in the female, the pale shade beneath becoming silvery towards the base; antennæ similar to those of the female, the hairs of the whorls longer and more abundant. Coloration as in the female. Tip of abdomen expanded, with numerous coarse bristles; ventrally the scales are raised along the median line. Wings slightly narrower than in the female, the venation and vestiture about the same. Middle legs slightly shorter than the anterior ones, the last tarsal joint armed with a single, large, simple claw; femora nearly silvery white beneath; tibiæ and tarsi with a brilliant, pale-brassy luster be-

Digitized by Google

neath; middle tarsi with white markings on the outer side as in the female. Claw formula, 0.0–0–0.0.

Length: Body about 3 mm.; wing 2.8 mm.

Genitalia (plate 3, fig. 16): Side-pieces tapered, constricted beyond the middle, excavated at tip for insertion of clasp-filament. Clasp-filament swollen at the base, inflated outwardly, distorted and branched, inner branch angled, slender beyond the base, bearing a row of setæ, a leaf-like appendage and two hairs at its origin, a small branch outwardly bearing a claw; apex rounded, spinose. Harpes slender, incurved, revolute. Harpagones indistinguishable. Basal appendages small, separated, bearing three setæ.

Larva, Stage IV (see figure of the entire larva, plate 46).—Head rounded, hind angles roundedly prominent, forming a right angle between the posterior edge of the occiput and lateral margin behind the antennæ; no incision at base of antennæ; front margin roundedly arcuate. Antennæ moderate, cylindrical, slightly tapered, smooth, a single hair at terminal third; one long, two moderate, two short terminal digits. Eye small, round. Both pairs of dorsal hairs and ante-antennal hair single. Mental plate triangular, one stout terminal tooth and nine on each side, uniform, subequal. Mandible quadrangular, convex without, a slight basal spinulation; one pair of appendages before tip, one long, one rudimentary; an outer row of cilia; a row of filaments beyond the cilia, six long-furcate, two simple; dentition small, four teeth on a narrow process, a thin tooth without and a smaller one at base; a filament and five feathered hairs within; interior lobe with short setæ; a few long setæ at base. Maxilla elongate hemispherical, bisected by a band-shaped suture, hairy and spined within; a row of setæ at tip. Palpus short, quadrate, with four small terminal digits. Mouth-brushes moderate, normal. Thorax quadrangular, slightly rounded at corners, flattened, wider than long; hairs strongly developed, long. Abdomen slender, the segments subequal, moniliform; hairs abundant, very long, the long lateral tufts multiple, diminishing posteriorly; short tufts well developed, longer than width of body. Tracheal tubes moderately broad, band-shaped, flexuous, narrow in seventh and eighth segments. Air-tube tapered-conic, about four times as long as wide, without pecten; rather thickly covered with moderate single hairs. Lateral comb of eighth segment of seven spines in a single row; spine quadrangular, with pointed base, shaft produced into a broad, flat process over half as long as the spine, fringed with fine spines. Anal segment wider than long with a dorsal plate three-fourths inclosing the segment; dorsal tuft of long hairs; a lateral tuft of three long hairs at the angle of the plate; a subventral tuft of three long hairs; no ventral brush. Anal gills moderate, broad, only two developed, the other two rudimentary.

Pupa (plate 148, fig. 697).—Thoracic mass subpyriform, small, indented behind the insertion of antennæ; a tuft of two hairs from near margin of eye is bent twice at right angles; respiratory trumpets small, cylindrical. Abdomen rather long; a pair of fan-shaped dorsal tufts on first segment; a pair of long subdorsal hairs at ends of second to fifth segments; ample tufts on apical angles of seventh and eighth segments. Anal paddles small, pointed.

We quote the life history and habits from Professor J. B. Smith, who has had this insect under special observation:

"The most characteristic habit of the adult is its inability or disinclination to bite and suck blood—of human beings at least. Mr. Brakeley has been in the bogs and swamps where there must have been hundreds of them and never a one has come to disturb him. He has even seen them about, among the pitcher plants, apparently engaged in ovipositing, and they paid not the slightest attention to him. Since the spring of 1901 hundreds of specimens have been

Digitized by Google

annually bred in my laboratory and often examples escape. On one solitary occasion a specimen lit upon my hand resting on the back of a chair, and I kept very quiet for several minutes watching it. It moved about a little, touched the surface with its beak several times with a sort of jabbing motion; but made no real attempt to puncture. It tried to assume the resting position but seemed to be annoyed by the hair on the hand and after shifting about for a little flew away. . . The resting position is peculiar. The head points downward at an angle to between the front legs and the hind legs are curled over so far as to give the insect the appearance of attempting a somersault and being caught midway in the attempt.

"The adults do not make their appearance under natural conditions until the end of May, and issue irregularly until the end of October or even early November. . . . Nothing has been observed as to the length of adult life and nothing is known of their feeding habits. Mr. Brakeley has seen them apparently ovipositing during the day. I have never found them on flowers and the inference is that they are, under ordinary conditions, active only at night."

The larvæ were first discovered by Mr. J. Turner Brakeley, who found them in November, 1900, in the leaves of the pitcher-plants in the swamps surrounding his cranberry-bogs at Lahaway, New Jersey. The species was not identified at the time, and was supposed to be the common *Culex pipiens*, as at that time our knowledge of the larvæ of our native mosquitoes was very imperfect. Fortunately Mr. Brakeley persisted in his investigations.

"In January, 1901, he cut out a few of the pitcher plant leaves, stripped them from the core of solid ice that they contained and, looking through it, saw wrigglers imbedded in all parts, in all sorts of shapes; but mostly in a half coil. The temperature had been down to two degrees below zero as registered by a standard minimum thermometer, and radiation probably lowered this even more.

"A number of leaves were gathered, the cores of ice with all they contained were removed, and the lumps were placed together in a jar in a moderately warm room. The ice melted slowly, and, as the larvæ were gradually freed, they dropped to the bottom where, for a time they rested; apparently lifeless. But as the amount of ice decreased, feeble motions here and there indicated a revival and, long before the lumps were completely melted, those first released were moving about actively. This, be it noted, was in water not much above the freezing point and, when the ice had all melted and the debris had settled, the larvæ became busily engaged in feeding.

"The specimens were sent to me as a curiosity, January 22d, and arrived in very good condition. A few had succumbed to the dangers of the journey, but, altogether, there was a good lot of lively wrigglers. The bottle was nearly full of water, it had had a five mile wagon drive over a rough road, had been transhipped no less than four times before it reached New Brunswick, and then was thrown into a delivery wagon and jolted through the city streets before it actually reached me. Under these circumstances any regular breathing of the kind usually described was utterly out of the question and the drownings should have been numerous; but really only a small number died.

"At short intervals other jars were received, all out of melted ice taken from pitcher plants, until I had several hundred active wrigglers in eight different jars. Some of the leaf chunks had only ten or a dozen larvæ, others ran as high as thirty or more. The jars were all placed on a counter shelf near a steam radiator, and it was expected that in a few days there would be pupæ and adults. But the days passed into weeks and the weeks into months without change other than a very gradual increase in size. The larvæ were just as active

Digitized by Google

as could be expected and fed continuously, but they showed no disposition to change their condition.

"As the fragments settled the water became clear and the larvæ congregated over the sediment, feeding head down and frequently rooting into it. It was rare that an individual was observed at the surface with the spiracle in breathing position. I watched patiently for fifteen minutes at a time, without noting a single individual rising to the top and Mr. Dickerson watched almost continuously one day for two hours and declares that during that time only a small percentage of the entire number rose to the surface.

"Occasionally a number of specimens would be at the surface, feeding, head up, so that the mouth brushes skimmed the surface, and these were watched on occasions for twenty minutes, without noting any attempt to assume the breathing position. In fact, during the two months that these larvæ were under daily observation, the rising to the surface to breathe was the rare exception rather than the rule. Usually they were feeding, head down, over the bottom sediment, or head up along the sides of the jar and at the top. The mouth brushes serve also as organs of locomotion and the larvæ were able to make their way from one point to another, without moving any other part of the body. They often allowed themselves to sink slowly to the bottom without any motion whatever, and sometimes to sink more rapidly curled themselves up into a ring. Occasionally a specimen got hold of a bubble of gas formed at the bottom and allowed itself to be floated to the surface. It was interesting to watch the little fellows; but as week after week passed it became just a little tedious; therefore, to hasten matters, I placed, March 1st, the two jars first received on a water bath, which kept the temperature as nearly uniform as the varying pressure of the gas allowed—say between eighty degrees and ninety degrees Fahr.

"A difference in growth was observable after a few days and on March 18th the first pupa was noticed, from which an adult was produced on the 21st, a period of three days. Three other pupæ were obtained within a week and these changed to adults in about the same time.

"March 24th, I made an experiment which resulted fatally. It occurred to me that the slow growth might be due to lack of food and as Mr. Brakeley wrote that his larvæ attacked and devoured a small gnat I determined to add food to the water. Accordingly I placed a small lump of beef in each of five experiment jars. Next day at a casual glance I noted nothing unusual, but March 26th, at 8 a. m., I found the insects at the top, tube out and evidently in distress. I fished out all the meat particles at once, but the mischief had been done, and most of the larvæ died. Evidently this species does not thrive in foul water; a fact which Mr. Brakeley determined also from his field collections.

"As the season progressed Mr. Brakeley kept sending in larvæ and these matured in such numbers that I was able to supply material in sufficient quantity to enable Mr. Coquillett to determine that instead of *Culex pipiens* we had a new species to deal with; one which will have to descend to posterity as a member of the Smith family, unless perchance it proves to have been previously described.

"Mr. Brakeley kept a duplicate series of specimens under observation at Lahaway, and his first pupa, from larvæ thawed out of ice February 17th, was obtained April 16th, and became adult on the 26th. This gives a period of fifty-eight days in active larval life, at an ordinary indoor temperature, or sixty-eight days if the pupal period is counted. Other pupæ and adults developed and the pupal period ranged between ten and twelve days. A small lot of specimens gathered April 7th began pupating May 1st, and these had an average pupal period of eight days.

Digitized by Google

"Altogether Mr. Brakeley sent me, prior to May 1st, some fifteen to twenty lots of larvæ, numbering many hundreds of specimens. All these were kept in original pitcher leaf water and this never became foul. It required the contents of from forty to seventy-five pitchers to make a full pint of liquid, and the larvæ numbered from two to twenty or more in each leaf. Culture after culture was closed out during the summer; but though the conditions for all the larvæ in a single jar were absolutely the same, the rate of development varied in each individual. One quart jar, containing nearly 200 larvæ, received in early March, developed adults throughout the summer, and this was not closed out until September 13, 1901, six months after its receipt, when there were yet a few larvæ, two or three pupæ and one or two adults! These larvæ had been surely hatched in November, 1900, and had remained in that condition for certainly ten months, including the entire summer.

"May 31, June 1 and 2, were spent at Lahaway with Mr. Brakeley, and during those days the swamps for some distance around were visited and dozens of pitcher plants closely examined.

"In the areas flooded during the winter by cranberry bog operations, no larvæ were found; but as soon as the flood line was passed, larvæ were taken; generally half a dozen or more to a leaf. But none occurred except in the leaves. This point was tested very thoroughly throughout the season and it is absolutely certain that this little species does not occur anywhere outside of the receptacles formed by *Sarracenia*, except by accident. In the colder, shaded parts of the swamp, where springs occurred, larvæ only were found. In the warmer areas pupæ were common and, in some places, where water and moss surrounding the plant were actually tepid, the insects had already emerged and nothing but empty pupa shells could be found. It seems to be entirely a matter of temperature, and in some of the coldest places, no transformations would be likely to occur much before late June. It is certain that most hibernating larvæ live from early November to late May or early June, a period of fully six months. No adults could be found and certainly none made any attempt to bite. Nor could egg masses or young larvæ be discovered at this time. New leaves were developing and few yet contained any water. Such of these as were examined contained no insect life and only here and there one had trapped insects; none had begun to digest or assimilate the animal food.

"An open swamp at the head of a cranberry bog had most of the leaves with pupal shells only, but though there must have been hundreds of adults about, not one could be found flying, nor could we stir them up. In a deep, cold, huckleberry swamp, only larvæ were found. It was fair to conclude from the three days' tramp that no summer brood of larvæ had yet begun, and it seemed strongly indicated that the insects would not bite, even if given the opportunity. In confirmation it may be said that late in the summer Mr. Brakeley saw specimens flying, and though there must have been thousands of others round about, none made any effort to disturb him.

"July 3d the leaves contained half and full-grown larvæ, but neither pupæ nor very small larvæ. July 13th old and new leaves contained very small larvæ—evidently of recent date, while the old leaves had also grown larvæ and pupæ. There was, therefore, a new series of larvæ and probably the first summer brood. July 23d, the older leaves had very few larvæ, but almost as many very small as large ones. The new leaves had all stages, from very small larvæ to pupæ. The indications were, therefore, that the first summer brood was coming to maturity, devloping in from fifteen to twenty days, while there were yet adult individuals from the winter larva that were ovipositing. From the small numbers of young larvæ in individual leaves, the indications were that eggs were laid either singly or in small groups.

Digitized by Google

"The next sending did not come until August 21st, and then there was everything from the most minute larva to pupæ just ready to transform. So small were some of the larvæ that I hunted for eggs or egg shells, but failed to recognize any. It is probable that the youngest larvæ represented a third brood, but breeding was practically continuous, all stages being found at any time after the middle of July.

"September 1st the same conditions existed and there was a large number of larvæ so small that it seemed as if at least egg shells must yet remain, but none were found. Fortunately Mr. Brakeley returned to Lahaway early in this month and on the 13th—lucky day—he found the eggs floating on the surface of the water in the pitcher plants.

"September 14th, I had an opportunity to spend a couple of hours in a swamp in the pines near Hanover Station, Burlington County, and found the pitcher plants there full of the *Wyeomyia* in all stages from babes to pupæ. Collected the entire contents of the pitchers in alcohol, and found afterward that eggs were present in some numbers. But meanwhile Mr. Brakeley had positively identified them, and had even bred a lot of larvæ, making the relation absolutely certain. He collected from time to time, until October 20th, and found anywhere from five or six to thirty or more eggs in a single leaf. Oviposition was continuous, but on only two occasions were adults seen apparently engaged in the process. It is probable that the egg-laying is done mostly at night.

"After the eggs had once been identified there was no difficulty in finding them, but it was noted that in the older leaves, where larvæ were now most abundant, they were not so plentiful as they should be to account for the large winter supply. So attention was directed to the younger leaves, even where there was as yet no water in them. Here, is was discovered, was the favorite place for ovipositing, with this species. Eggs were laid in leaves as yet perfectly dry, at the bottom and at the sides, singly or in little groups, whether by one or more than one female was not ascertained. Of the old leaves many become imperfect in late fall and any puncture or decay allowing the water to escape would, of course, mean the death of the larvæ. So the new leaves are selected and in them many more eggs were found than in the others. In one case Mr. Brakeley counted up to seventy-five, then lumped the remainder and called it one hundred. It is scarcely probable that any one female of this species is capable of producing one hundred eggs of the comparatively large size of those in question; so two at least, and possibly more females may oviposit in a suitable leaf.

"Observations were continued until frost, which came unusually early in 1901. Up to November eggs were found, and early in that month a few pupæ. So breeding is continued just as long as there is a chance to keep it up.

"The eggs are chestnut brown in color, somewhat chunky, bean-shaped, the ends somewhat pointed, the inner margin nearly straight. There is no evident sculpture, yet when first mounted and examined under the microscope, there seems to be a somewhat irregular tessellated reticulation that disappears later, when the shell becomes more transparent.

"In the previous notes it was brought out that this larva does not need to come to the surface for air as much as recorded for *Culex*. Dr. Howard informed me that a lot of larvæ that I sent him later lived for nearly two weeks under a film of oil which covered the surface of their breeding jar.

"One of my students demonstrated in the laboratory a very complete tracheal system in the anal processes of the larva, so we have really a gill structure, by means of which the insect gets its supply of oxygen directly from the water.

"Briefly stated, the life history is as follows: The insect winters in the larval stage, freezing and thawing as often as need be during that season. It pupates late in May and becomes adult a week or ten days later. Eggs are laid in the leaves singly or in small groups fastened to the sides or floating on the

Digitized by Google

surface. The summer broods mature in about a month, and there are probably three if not four series, but the broods overlap so much that the breeding is practically continuous. Late in the season the adults select the new leaves for oviposition even if they are yet dry."

To Dr. Smith's observations we can add that the length of larval life, as in related forms, is very variable, depending upon the food in the form of insects which are drowned in the leaf-pitchers, naturally a variable factor or one which may fail altogether for a period. We have kept larvæ alive in the original water and without food for nearly an entire year. As the eggs are laid in the dry, young leaves the egg-period likewise must be variable, depending upon the advent of water in the leaves.

North America, Canada to Alabama, probably coextensive with range of its host plant, *Sarracenia purpurea.*

Tupper Lake, New York, larvæ in pitcher-plant leaves in a bog, August, 1905 (H. G. Dyar); Crab Lake, Vilas County, Wisconsin, larvæ in the leaves of pitcher-plants in a swamp, November, 1907 (H. S. Barber); Dublin, New Hampshire, August, 1909 (H. G. Dyar); Westfield, Massachusetts, adults bred from larvæ in pitcher-plant leaves, July and August, 1903 (F. Knab); Springfield, Massachusetts, adults bred (G. Dimmock); Cedar Lake, Illinois, larvæ in pitcher-plant leaves, June, 1892 (S. A. Forbes); Lahaway, Ocean County, New Jersey, eggs, larvæ in all stages, and adults from pitcher-plant leaves (J. T. Brakeley); Baltimore, Maryland, November, 1901 (Dr. Coker); Washington, D. C., larvæ in pitcher-plant leaves in a greenhouse (Miss E. G. Mitchell); Boardman, North Carolina, April, 1904, larvæ in leaves of *Sarracenia purpurea* (A. D. Hopkins); Swansea, South Carolina, August 11, 1911, adult captured (F. Knab); Theodore, Alabama, April, 1910, adults bred from *Sarracenia purpurea* (F. M. Jones). Reported also from Guelph, Ontario (T. D. Jarvis).

This is the only known sabethine mosquito inhabiting temperate latitudes. It is of perfectly normal structure, and has close allies in the tropics, inhabiting the leaves of Bromeliaceæ. Our species was first discovered in the larval state, but its peculiarities passed unnoticed, owing to the imperfect state of the knowledge of the subject at the time. It was finally recognized as a new species, but was placed in the genus *Aëdes,* on account of the short palpi of both sexes. After the erection of the sabethid genera by Mr. Theobald it was determined to belong to the genus *Wyeomyia* by Mr. Coquillett, although first published under this name by Doctor Felt. Mr. Theobald lately places it in *Dendromyia,* owing to the comparatively broad wing-scales, but we consider this genus synonymous with *Wyeomyia.* Mr. Coquillett identified specimens from Florida, bred from Bromeliaceæ as this species, and this record has been published by Smith and Theobald; we here identify these specimens as *Wyeomyia vanduzeei.* Mr. Coquillett had also identified several other species from Florida, the Bahamas and Cuba as *Wyeomyia smithii.* These identifications, so far as we know, have been published by Smith for Florida, referred here to *W. vanduzeei* (p. 65), by Dr. Pazos for Cuba, which will be found here under *W. violescens* (p. 79), and by Dr. Coffin for the Bahamas, which will be found here under *W. bahama* (p. 62). Theobald further records *Wyeomyia smithii* from Rio de Janeiro, Brazil, but this is very clearly an error of identification. Peryassú followed Theobald, and as he quotes his description of our species, we are obliged to cite him in the bibliography.

WYEOMYIA CODIOCAMPA Dyar & Knab.

***Wyeomyia codiocampa* Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 209, 1907.**
***Wyeomyia codiocampa* Busck, Smiths. Misc. Colls., quart. iss., iii, 73, 1908.**
***Wyeomyia codiocampa* Theobald, Mon. Culic., v, 581, 1910.**

Digitized by Google

ORIGINAL DESCRIPTION OF WYEOMYIA CODIOCAMPA:

♀.—Proboscis rather short and stout, thickened towards the apex, black scaled; clypeus large, globose, brown with minute gray pubescence; palpi very short, black scaled; eyes divided by a narrow white-scaled strip; occiput clothed with brownish iridescent scales, the ocular margin narrowly white and forming a triangular patch between the eyes; prothoracic lobes large, prominent, well separated, the basal portion silvery white, tip also white, the central portion blackish brown; mesonotum short, convex, clothed with bronzy brown scales; setæ of the scutellum ferruginous yellow; metanotum pitchy black with a group of setæ towards the apex; abdomen rather stout, compressed, truncate at the tip with numerous terminal coarse bristles, black scaled above, creamy white beneath, the white forming deep lateral incisions at the apices of the segments; legs dark, with bronzy luster, the fore legs pale brassy beneath throughout their length, mid legs with the apical portion of the second, the third and fourth joints silvery white beneath, hind legs with the second and third joints silvery white beneath, the fourth and fifth bronzy brown. Length, 4 mm.

♂.—Antennæ shorter than in the female, the hairs of the whorls more numerous; palpi very short, white scaled; abdomen strongly compressed along the anterior two-thirds, the apex dilated, with lateral and ventral groups of coarse bristles; front legs with the third and fourth joints silvery white beneath, the middle and hind legs light brassy beneath, on the mid legs becoming silvery white on the third and fourth joints, on the hind legs the apical half of the first, the second, third and basal part of the fourth joints silvery white beneath. Length, 4.5 mm.

Eleven specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), part of the specimens bred from larvæ in bamboo joints, the others caught in a bamboo woods.

Type.—No. 10853, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA CODIOCAMPA:

Female.—Proboscis rather short and stout, enlarged apically, labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous brown, with a silvery-white pruinosity; hairs of whorls long, rather sparse, black. Clypeus broadly rounded, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a small white spot at the vertex and a narrow border along the lower half of the eye, widening to a patch below; two long setæ at the vertex and short ones along the margin of the eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat scales, brown in the middle, silvery white at tip and base; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat brown scales, with bronzy and blue reflection; scales on anterior margin and below lateral angles whitish; bristles over roots of wings brown. Scutellum trilobate, with the vestiture similar to and continuous with that of the mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a low, broad median carina, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, the coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, strongly compressed, truncate at tip, with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the color continued on the sides as triangular lateral patches along the posterior margins of the segments; the scales raised along the mid-ventral line.

Wings moderate, hyaline; petiole of second marginal cell less than one-half as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins small, appressed, narrowly triangular, black, with bronzy reflection on the costa, broader and denser on second to fourth vein apically. Halteres whitish with black knobs.

Digitized by Google

Legs rather long and slender, black with a bronzy and blue reflection, femora whitish beneath; all the tibiæ and first joint of hind tarsi pale brassy beneath, the other tarsals pale bronzy beneath; mid tarsi with apical portion of second, all of the third and fourth joints white on outer side; hind tarsi with second and third joints silvery white beneath. Claw formula, 0.0–0.0–0.0, the hind tarsi with one claw small.

Length: Body about 4 mm.; wing 4.3 mm.

Male.—Proboscis more gradually enlarged at the tip than in the female, the basal half silvery beneath. Palpi minute. Antennæ a little more densely haired than in the female, with a small secondary whorl towards the apices of the joints. Coloration similar to the female. Abdomen slightly enlarged at the apex, with a dense tuft of terminal hairs divided into four groups. Wings of same shape as in the female, the stems of the fork-cells a little longer. Mid legs shorter than the anterior ones, their tarsi with last three joints curved inwardly in an arc, the last joint with a single claw. Hind legs white beneath on first three and base of fourth tarsal joints; mid legs with third except at base and all of fourth tarsal joints white above. Claw formula, 0.0–0–0.0, those of hind tarsals unequal.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 3, fig. 10): Side-pieces short, the tip stoutly conical, somewhat excavated for insertion of clasp-filaments; three long setæ in a row. Clasp-filament with stout, short base, the tip expanded and divided into three lobes; outer lobe long and slender; middle one broad, obliquely truncate, and bearing a terminal row of long, fine setæ; inner lobe a short projection upon the middle one, bearing a spine. Harpes rather long, slender, the tips obscurely toothed, a long crest of dense, fine hairs arising from its tip. Harpagones forming a basal cone, the unci a similar, smaller one. Basal appendages represented by three smaller, stout setæ. Penultimate segment with a projecting rounded lateral process bearing long hairs; a second smaller process within.

Larva (plate 88, fig. 280).—Head rounded, nearly circular in outline, the posterior angles slight; antennæ small, uniform, a single hair beyond the middle; dorsal head-hairs single and rather short, ante-antennal hairs in small triple tufts. Abdomen with all the hair-tufts coarse and stellate, the lateral hairs single, long. Air-tube moderate, about four times as long as wide, uniformly slightly tapered, the terminal hooks small; two single hairs on dorsal aspect, ventrally one on basal fourth and one near tip. Lateral comb of eighth segment on a large, irregularly elliptical plate, of six large, blunt-tipped teeth; tuft behind multiple. Anal segment rather longer than wide, with a large dorsal plate; dorsal tuft of four long hairs on each side; lateral tuft at angle of plate of three long hairs; subventral tuft multiple, short. Anal gills rather short, upper pair somewhat shorter than lower ones.

Mr. Busck obtained the larvæ in bamboo-joints which he had cut and prepared. The species is probably addicted to tree-holes and similar locations. The hair-tufts are greatly developed, giving the larva a peculiar appearance. Mr. Busck says:

"These were the most extraordinary-looking mosquito larvæ which have come under my observation, and resemble more young caterpillars than dipterous larvæ; they are short, fat, and rotund, and covered with many long, black spines in closely set clusters. The movement of the body is therefore short and slow, and they remain for long periods under water, quietly feeding in the decomposed vegetable matter in the bottom."

Panama.

Tabernilla, Canal Zone, larvæ in bamboo-joints, May 9, 1907; also adults captured in bamboo woods (A. Busck).

Digitized by Google

WYEOMYIA ABLABES Dyar & Knab.

Wyeomyia ablabes Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 66, 1908.
Wyeomyia ablabes Theobald, Mon. Culic., v, 626, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA ABLABES:

Female.—Proboscis long and slender, somewhat enlarged towards the apex, black-scaled; palpi black-scaled; occiput dark-scaled, with blue and green reflections, the margin of the eyes narrowly whitish scaled and forming a distinct silver spot on the vertex; prothoracic lobes dark-scaled, with violaceous luster, the tips silvery-scaled; mesonotum dark-scaled, with faint bronzy and blue reflections; pleura silvery white-scaled; abdomen black-scaled above, with slight blue and bronzy reflections, beneath white-scaled, the colors separated on the sides in a straight line; legs dark-scaled, with bronzy and blue luster; on the middle legs the extreme apex of the second tarsal joint and all of the third and fourth white beneath; on the hind legs the fourth and fifth tarsal joints are white beneath except at their extreme apices. Length, 3.5 mm.

Male.—Resembles the female in coloration.

Eighteen specimens, selected from a series, Córdoba, Mexico, bred from larvæ in water between the leaves of bromeliaceous plants. (F. Knab.)

Type.—Cat. No. 11986, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA ABLABES:

Female.—Proboscis moderate, tip somewhat expanded, labellæ small, rounded, with fine outstanding setæ; vestiture bluish black, paler bronzy beneath. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with a slight pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a bronzy and blue reflection, a continuous white margin behind the eyes joining a large white patch at lower part of sides; a row of setæ along margin of eyes, two long ones at vertex.

Prothoracic lobes elliptical, distinctly separated, clothed with flat black scales with bronzy violaceous luster, the tip rather broadly and base silvery white. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales on front margin and below lateral angles whitish; hairs over root of wing dark brown. Scutellum trilobate, with the vestiture similar to and continuous with that of the mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a broad, flat median carina, dark brown, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long, dark-brown terminal setæ; dorsal vestiture black with a bronzy and blue reflection; venter yellowish white, colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell less than half as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant less than its own length from the anterior cross-vein; scales of veins dense, moderate, ligulate, black, with a slight bronzy reflection on the costa, densest and broadest towards tip of wing. Halteres whitish with black knobs.

Legs rather long and slender, black, with a bronzy reflection, the femora yellowish silvery beneath; tibiæ brassy beneath, tarsi with a pale-bronzy luster below; mid tarsi with tip of second, and all of last three joints silvery white on outer side; hind tarsi with white marks at bases of first to third joints, fourth and fifth joints white beneath, except tip of fourth joint. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Digitized by Google

Male.—Proboscis longer and more slender than in the female, the palpi about one-eighth as long as proboscis, slender, dark-scaled. Antennæ similar to those of the female, hairs of whorls longer and more abundant. Coloration as in the female. Wings slightly narrower than in the female, the venation similar, the outstanding scales sparser and broader. Mid legs shorter than fore legs, first tarsal joint but slightly longer than second, last four joints bent inward; markings as in the female. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm; wing 3 mm.

Genitalia (plate 4, fig. 21): Side-pieces over twice as long as wide, tapering to tips; basal lobes rounded triangular, setose; three long setæ in a line below middle of side-piece. Clasp-filament with a long, slender stem, the tip expanded and divided into three lobes; outer lobe long, slender, with a seta and small hooked tip; middle lobe broad, the tip broadly truncate, bearing rows of setæ and a thickened, lined, central area; inner lobe small, slender, smooth. Harpes concave, inner margin thickened, curved at tip, and obscurely dentate. Harpagones and unci forming small, basal cones. Basal appendages small, each with three short stout setæ.

Larva, Stage IV (plate 88, fig. 281).—Head broadest at posterior angles, subquadrate, anterior margin rounded; antennæ rather long, slender, a small double hair beyond middle; upper pair of dorsal tufts in fours, lower pair of two long hairs; ante-antennal tuft multiple. Abdomen with the lateral hairs in twos, the subdorsal tufts stellate; tracheæ broad. Air-tube moderate, about four times as long as wide, slightly tapering on outer half, the terminal hooks stout, moderate; numerous single hairs scattered rather evenly over the surface, those nearest apex shorter and doubled. Lateral comb of eighth segment a row of rather stout, single spines, becoming smaller ventrally; tuft behind the comb of two long hairs. Anal segment longer than wide, with a large dorsal plate with rounded angles; dorsal tuft of two long hairs on each side, the lateral tuft of posterior angle of plate of two long hairs; subventral tuft large, multiple, moderately long. Anal gills equal, somewhat longer than the segment, broad, with pointed tips.

The larvæ live in water at the leaf-bases of epiphytic Bromeliceæ. Mr. Knab found them in some small bromeliaceous plants on a tree about five feet from the ground in a coffee plantation, associated with a single larva of *Megarhinus superbus;* again along a stream near the previous locality on some large trees overhanging the stream in some bromelias near the base of the tree, associated with *Wyeomyia abebela, Megarhinus superbus, Culex rejector,* and a small *Anopheles* larva, which was not bred, probably *Anopheles neivai;* also in bromelias on a large felled tree in a shaded place on a hillside in a coffee plantation, associated with *Culex rejector;* also in a bromelia on a tall mango tree about twenty feet from the ground, one of the plants dry, the other containing water but choked with rubbish, a third full of larvæ, associated with *Wyeomyia abebela* and *Culex rejector;* of two other bromeliads on this same tree, about fifty feet from the ground, one contained this species associated with *Wyeomyia abebela, Culex rejector, Culex stenolepis,* and *Megarhinus superbus;* the other contained the *Culex* and *Megarhinus,* but none of the *Wyeomyia.* The adults flew in the vicinity of the trees, and bit in the daytime.

Southern Mexico.

Córdoba, larvæ in Bromeliaceæ in several places near the town, December 23, 1907, January 16, 1908, March 17 and 21, 1908 (F. Knab); Millan, State of Vera Cruz, January 2, 1908 (F. Knab).

Digitized by Google

WYEOMYIA LABESBA, new species.

DESCRIPTION OF FEMALE AND LARVA OF WYEOMYIA LABESBA (MALE UNKNOWN):

Female.—Proboscis moderate, tip somewhat expanded, labellæ small, rounded, with fine outstanding setæ; vestiture bluish black, brassy beneath nearly to tip. Palpi short, flattened, one-eighth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with a slight pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded, broad, dark brown, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a slight bronzy reflection, a narrow white margin behind the eyes, constricted or interrupted subdorsally, joining a large white patch on lower part of sides; a row of setæ along margin of eyes, two long ones at vertex.

Prothoracic lobes elliptical, distinctly separated, clothed with flat black scales with bronzy violaceous luster, tips rather broadly and the base silvery white. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue reflection, scales on front margin and below lateral angles whitish; hairs over roots of wing dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a broad, flat median carina, dark brown, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long dark-brown terminal setæ; dorsal vestiture black with a bronzy and blue reflection; venter silvery white, the colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of the second marginal cell less than one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from the anterior cross-vein; scales of veins dense, moderate, ligulate, black, with a slight bronzy reflection on the costa, densest and broadest towards tip of wing where they become subovate. Halteres whitish with black knobs.

Legs rather long and slender, black, with a bronzy reflection, the femora and tibiæ brassy beneath, femora silvery at base; tarsi with a pale-brassy luster below; mid tarsi with apical two-thirds of third, and all of fourth and fifth joints silvery white on outer side; hind tarsi with fourth and fifth joints white beneath, except tip of fourth joint. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.8 mm; wing 2.8 mm.

Type: No. 12702, U. S. National Museum.

Larva, Stage IV (plate 89, fig. 282).—Head subquadrate, anterior margin rounded, broadest at posterior angles; antennæ rather long, slender, a small double hair beyond middle; upper pair of dorsal tufts in fours, lower pair of two rather long hairs; ante-antennal tuft multiple. Abdomen with the lateral hairs in twos, the subdorsal tufts stellate; tracheæ broad. Air-tube moderate, over four times as long as wide, slightly tapering on outer third; terminal hooks stout, moderate; numerous single hairs scattered rather evenly over surface, those nearest apex shorter and doubled. Lateral comb of eighth segment a row of rather stout single spines, becoming smaller ventrally; tuft behind the comb of two long hairs. Anal segment longer than wide, with a large dorsal plate with rounded angles; dorsal tuft of two long hairs on each side; laterally on posterior angle a single long hair; subventral tufts large, multiple, moderately long. Anal gills equal, somewhat longer than the segment, broad, with pointed tips.

Digitized by Google

Mr. Jennings found the larvæ in wild pineapple plants along the edge of a swampy pasture; "no bush within a quarter of a mile."

Panama.

Ancon, Canal Zone, December 24, 1908 (A. H. Jennings); Tabernilla, Canal Zone, February 4, 1909 (A. H. Jennings).

This species is closely allied to *Wyeomyia ablabes*, but differs slightly both as adult and larva. We are not certain whether the host plant is really the cultivated pineapple or some other terrestrial bromeliad.

WYEOMYIA GYNÆCOPUS Dyar & Knab.

Wyeomyia gynæcopus Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 66, 1908.
Wyeomyia gynaecopus Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA GYNÆCOPUS:

Female.—Proboscis moderately long, slender, much dilated toward the apex, black-scaled; palpi black-scaled, with bronzy luster, the tips silvery white; occiput dark-scaled, with green and blue iridescence, the margin of the eyes narrowly silvery-white scaled; prothoracic lobes dark-scaled, with bluish iridescence, the apices narrowly silvery tipped, the basal portion mostly white-scaled; mesonotum bronzy brown-scaled, with obscure bluish reflection; abdomen deep bronzy brown above, with blue reflection, beneath coarsely white-scaled, the colors separated on the sides in a straight line; legs dark, with bronzy and bluish reflections, the hind legs with the under side of the fourth and fifth tarsal joints white-marked; on the fourth joint the white extends from the base nearly to the apex, the fifth white at the base. Lengh, 3.5 mm.

One specimen, Esparta, Costa Rica, September 18, 1905. (F. Knab.)

Type.—Cat. No. 11984, U. S. N. M.

DESCRIPTION OF FEMALE OF WYEOMYIA GYNÆCOPUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, tip expanded, labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black. Palpi short, flattened, one-sixth as long as proboscis, bronzy black, paler bronzy at tip. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus broadly rounded, convex, dark brown, silvery pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a blue reflection, a narrow, pale margin behind the eyes, narrowest each side of vertex, joining a large white spot at lower part of sides; two long bristles at vertex and a row of short ones along margin of the eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat blackish scales, white at base and narrowly so at tip. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection, scales below lateral angles whitish, bristles at roots of wings brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a broad, low median carina, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter yellowish white, the colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant nearly its own length from anterior cross-vein; scales of veins ligulate, denser and broadly cuneiform apically on second to fifth veins, tips of these scales subtruncate or broadly rounded; black, with a slight bronzy reflection on costa. Halteres whitish with black knobs.

Digitized by Google

Legs rather long and slender, black with a bronzy reflection, femora whitish beneath; tibiæ brassy beneath; tarsi with a brighter bronzy shade beneath; hind tarsi with basal three-fourths of fourth and basal third of fifth joints silvery white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

The adult was captured in a deep, heavily wooded ravine, in the daytime.

Costa Rica.

Esparta, September 18, 1905, a single captured female specimen (F. Knab).

WYEOMYIA ESPARTANA Dyar & Knab.

Wyeomyia espartana Dyar & Knab, Proc. Biol. Soc. Wash., xix, 140, 1906.
Wyeomyia espartana Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA ESPARTANA:

Prothoracic lobes dark centrally, the tips distinctly white. Similar to *W. ochrura* Dyar & Knab, but the lobes are darker and more contrastingly colored, black centrally with a distinct white tip.

One specimen, Esparta, Costa Rica (F. Knab).

Type.—Cat. No. 10,005, U. S. Nat. Mus.

DESCRIPTION OF FEMALE AND MALE OF WYEOMYIA ESPARTANA (LARVA UNKNOWN):

Female.—Proboscis rather short, tip expanded, labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black, with a brighter luster beneath. Palpi short, flattened, one-sixth as long as proboscis, bronzy black, tips shining, whitish. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, yellowish brown, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, whitish pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a bronzy and blue reflection, a narrow whitish margin behind the eyes, narrowed subdorsally, tending to form a spot at vertex, a large white spot at lower part of sides; two long setæ at vertex and a row of short ones along margin of the eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat, blackish submetallic scales, silvery white at base and tip. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales below lateral angles whitish, a few scales on anterior margin also whitish; setæ at roots of wings brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a broad, low median carina, dark brown, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, colors separated at sides in a straight line, the scales raised along mid-ventral line.

Wings moderate, hyaline; petiole of second marginal cell less than one-half as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant much less than its own length from anterior cross-vein; scales of veins rather long, ligulate, shorter and denser apically, black, with a slight bronzy reflection on costa. Halteres whitish with black knobs.

Legs rather long, slender, black with a bronzy reflection, the femora whitish beneath; tibiæ with a brassy luster beneath; tarsi with a light bronzy luster beneath, without white markings. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.8 mm.

Digitized by Google

Male.—Proboscis as in the female, with a pale-brassy luster beneath. Palpi short, about one-seventh as long as proboscis, clothed with rather coarse silvery scales throughout. Antennæ similar to those of the female, the joints with a secondary apical whorl of short hairs, hairs of basal whorls longer and more abundant than in the female. Coloration as in the female. Wings with vestiture slightly sparser than in the female. Abdomen rather long, subcylindrical, compressed, expanded at tip, the terminal hairs divided into four groups, scales raised along mid-ventral line. Legs with front tibiæ bright bronzy beneath. their apices and the tarsi with a brassy luster; mid legs with a pale-brassy luster beneath throughout, somewhat shorter than anterior ones, the tarsi curved inward in an arc, tip of third, all of fourth and fifth joints with a pale-brassy luster on upper side; hind tarsi bright bronzy beneath. Mid tarsi with a single claw, those of hind tarsi unequal; claw formula 0.0–0–0.0.

Length: Body about 3.5 mm.; wings 2.8 mm.

Genitalia (plate 3, fig. 9): Side-pieces stoutly conical, twice as long as wide, a lobe at tip next to insertion of clasp-filament; inner margin thickened in an elliptical area; three setæ in a line below middle of side-piece. Clasp-filament with a long, slender stem, the tip divided into three lobes; outer lobe slender, erect, with a hooked tip and row of setæ; middle lobe erect, slender, rounded; inner lobe projecting at right angles, rounded, bearing a row of setæ on its margin. Harpes slender, the tips bent and obscurely dentate. Harpagones and unci forming small basal cones. Basal appendages represented each by a row of four stout setæ. Penultimate segment with rounded lateral setose lobes.

Mr. Jennings obtained the larvæ in a hollow in the stump of a banana plant, but did not preserve any larval skins.

Costa Rica and Panama.

Esparta, Costa Rica, one adult taken in a deep, wooded ravine, September 18, 1905 (F. Knab); Caldera Island, Porto Bello Bay, Panama, larvæ in a banana stump, May 29, 1908 (A. H. Jennings).

The species was described from a single specimen taken in Costa Rica. We have been unable to distinguish specifically the specimens from Panama bred by Mr. Jennings. The two localities are somewhat remote, but their general faunistic conditions are not especially different. The material is, however, too scanty to base a positive conclusion upon.

WYEOMYIA DRAPETES Dyar & Knab.

Wyeomyia drapetes **Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 264, 1909.**

Original Description of Wyeomyia drapetes:

Proboscis short, swollen at the tip. Occiput dark-scaled, the eyes with a margin of white scales, widening into a spot on the vertex. Palpi white-tipped. Prothoracic lobes dark-scaled with silvery white tip and base. Abdomen dark-scaled above, white beneath, the colors separated on the sides in a straight line. Legs dark-scaled. Wing-scales short, dense and cuneiform on the forks of the second, third, and fourth veins. Length, 3.5 mm.

Male similar to the female, the palpi entirely white-scaled; mid tarsi with the outer half of the second and the last three joints pale brassy without.

Three specimens, San Juan, Trinidad, British West Indies, larvæ in bamboo stumps, associated with *Sabethes undosus* Coq. (A. Busck).

Type no. 12181, U. S. N. M.

Description of Female and Male of Wyeomyia drapetes (Larva Unknown):

Female.—Proboscis rather short, swollen apically, vestiture black, with slight bronzy luster, brighter beneath, labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-fifth as long as proboscis, bronzy black, tips broadly silvery. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation,

Digitized by Google

brown with a silvery-white pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at vertex by a wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a small, white spot at vertex, which is continued into a narrow border along the eyes, widening into a patch below; two long setæ at the vertex and a row of short ones along margin of the eyes.

Prothoracic lobes elliptical, distinctly separated, clothed with flat scales, blackish brown, with a minute white tip and a broad silvery-white base. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales on front margin and below lateral angles whitish; bristles at roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small, pale setæ near posterior margin. Pleuræ dark brown, the coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight, bronzy and blue reflection; venter white, colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins ligulate on fifth and sixth veins, short, dense, cuneiform on forks of second and fourth veins and on third vein; black, with a blue reflection on costa. Halteres whitish with black knobs.

Legs moderate, slender, black with bronzy reflection, the femora whitish beneath; tibiæ brassy beneath; front and mid tarsi with brassy luster beneath, hind tarsi bronzy. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Proboscis similar to that of the female. Palpi shorter than in the female, clothed with silvery scales throughout. Antennæ similar to those of the female, a small secondary whorl at tip of each joint, the basal whorls longer and more abundant than in the female. Coloration similar to the female. Wings slightly narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Abdomen subcylindrical, compressed, expanded at tip; terminal setæ divided into four groups. Front and mid legs with a strong brassy luster beneath; mid tarsi with the last four joints arcuate inwardly, apical half of second and last three joints with a strong, pale-brassy luster on outer side. Mid tarsi with only one claw, those of the hind tarsi unequal; formula, 0.0–0–0.0.

Length: Body about 3.5 mm.; wing 2.8 mm.

Genitalia (plate 2, fig. 8): Side-pieces over twice as long as wide, the tips concavely tapered, somewhat excavated at tip for insertion of clasp-filament, inner margin elliptically thickened; a slight hairy inner lobe; three setæ in line below middle of side-piece. Clasp-filament with a long, slender stem, tip divided into three lobes; outer lobe erect, with a slightly hooked tip and row of setæ; middle lobe uprightly slender, smooth; inner lobe projecting at right angles, broadly rounded, bearing a row of setæ towards the apex. Harpes slender, long, tips curved and obscurely dentate. Harpagones and unci forming small basal cones. Basal appendages represented by five small setæ on each side. Penultimate segment with a rounded, projecting, hairy lateral angle.

Mr. Busck found the larvæ in a bamboo stump in bamboo woods, but preserved no larval skins. We have also a specimen taken by Mr. Urich, but without breeding data.

Trinidad, British West Indies.

Digitized by Google

Montserrat (Trinidad), June 1, 1905, larvæ in bamboo stump near station, in bamboo woods, associated with *Sabethinus undosus,* which was observed to prey upon them (A. Busck); Trinidad (F. W. Urich).

WYEOMYIA ABEBELA Dyar & Knab.

Wyeomyia abebela Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 67, 1908.
Wyeomyia abebela Theobald, Mon. Culic., v, 626, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA ABEBELA:

Female.—Proboscis rather long and slender, enlarged toward the apex, black-scaled; palpi black-scaled; occiput dark-scaled, the margin of the eyes clear white scaled, forming a patch on the vertex; prothoracic lobes pearly violaceous in the middle, the tip and base silvery white; mesonotum dull brown-scaled, with obscure bronzy and blue reflection; pleura silvery white-scaled; abdomen dark-scaled above, with faint bronzy and blue luster, beneath coarsely white-scaled, the colors separated on the sides in a straight line; legs entirely dark-scaled, with bronzy and blue reflection. the femora and hind tibiæ light-scaled beneath; tarsi without white markings. Length, 3 mm.

Male.—Coloration as in the female

Six specimens, Córdoba, Mexico, bred from larvæ in water between the leaves of bromeliaceous plants. (F. Knab.)

Type.—Cat. No. 11987, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA ABEBELA:

Female.—Proboscis moderate, tip expanded, labellæ small, rounded, with fine outstanding setæ; vestiture bluish black, with brighter luster beneath. Palpi short, flattened, one-seventh as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, black, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, brown, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a blue reflection, a small white spot at vertex continued as a narrow border behind the eyes to a large white spot at lower part of sides; two setæ at vertex and smaller ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat blackish-brown scales, white at base and narrowly so at tip. Mesonotum clothed with elliptical, flat brown scales with a bronzy and blue reflection, scales on front margin and below lateral angles whitish; bristles at roots of wings dark brown. Scutellum trilobate, with the vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a bronzy and blue reflection; venter white, colors separated at sides in a straight line; scales raised along the mid-ventral line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins ligulate, becoming narrowly wedge-shaped and denser on forks of second and fourth and outer half of third vein, black, with slight bronzy reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black, with a bronzy reflection, the femora whitish beneath; tibiæ and tarsi with brighter bronzy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.8 mm.

Digitized by Google

Male.—Proboscis bronzy beneath, silvery toward base. Palpi similar to those of the female. Antennæ also similar, each joint with a small apical whorl, hairs of basal whorls longer and more abundant than in the female. Coloration as in the female. Abdomen subcylindrical, somewhat expanded toward tip. Mid tarsi slightly incurved, with a single claw, those of hind feet unequal; formula, 0.0–0–0.0.

Length: Body about 2 mm.; wing 2.5 mm.

Genitalia (plate 4, fig. 22): Side-pieces over twice as long as wide, tips much tapered; three setæ in a line below middle; clasp-filament with a long slender stem, tip expanded and divided into three lobes arising from a circular, disk-like expansion; inner lobe slender, elongate; middle lobe conical, with rows of setæ and teeth; outer lobe arising from angle of mid lobe, with a rounded, disk-like termination. Harpes slender, concave, the inner margin thickened, curved at tip and obscurely dentate. Harpagones and unci forming small basal cones. Basal appendages represented by a row of six setæ on each side.

Larva, Stage IV (plate 89, fig. 283).—Head subquadrate, anterior margin rounded, wider than long, sides somewhat flattened, no distinct posterior angles; antennæ small, slender, slightly curved, with a small tuft beyond middle; upper pair of dorsal hairs long, single; lower tufts triple, long; ante-antennal tufts of four long hairs. Abdominal lateral hairs very long, in fours on first segment, threes on second, single on third to sixth; subdorsal and subventral tufts stellate. Air-tube long, tapered gradually from near base, terminal half uniform, slender; about eight times as long as wide; terminal hooks slender; hairs abundant, long, uniformly distributed in two series, except near base and near apex, where they are absent, single, except the basal posterior tuft, which is two-haired. Comb of eighth segment of large spines in a long row, nowhere doubled, the rows nearly meeting ventrally; scales of comb stout, elongate, subequal, only slightly smaller ventrally. Anal segment longer than wide, with a large dorsal plate which reaches well down the sides, dorsal tuft of two very long hairs on each side; lateral hair single, long, arising from an angulation of the plate; subventral tuft multiple, rather long and few-haired, situated opposite the lower extension of the plate. Anal gills unequal, upper pair considerably shorter than lower pair, broadly lanceolate, with rounded tips.

The larvæ live in the water between the leaves of epiphytic Bromeliaceæ. Mr. Knab found them in three cases associated with the larvæ of *Wyeomyia ablabes,* but in smaller numbers. In some bromelias near the base of a tree overhanging a stream, associated with *Wyeomyia ablabes, Megarhinus superbus, Culex rejector,* and *Anopheles* sp., probably *A. neivai;* in bromelia on a tall mango tree twenty feet from the ground, associated with *Wyeomyia ablabes* and *Culex rejector,* and in another bromelia on the same tree, fifty feet from the ground, associated with *Wyeomyia ablabes, Culex stenolepis,* and *Megarhinus superbus.*

Southern Mexico.

Córdoba, larvæ in Bromeliaceæ in several places near town, January 16, March 17 and 21, 1908 (F. Knab).

WYEOMYIA HOSAUTUS Dyar & Knab.

Wyeomyia hosautus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 211, 1907.
Wyeomyia hosautus Busck, Smiths. Misc. Colls., quart. iss., lii, 73, 1908.
Wyeomyia hosantus Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA HOSAUTUS:

Proboscis rather short and stout, enlarged towards the apex, black scaled; palpi short, black scaled; clypeus prominent, black with fine grayish pubescence; the wedge between the eyes covered with silvery scales; occiput entirely dark scaled with blue and green iridescence, no pale margin to the eyes; prothoracic lobes large

Digitized by Google

and prominent, well separated, clothed with dark scales, the apex silvery scaled as also the base below; mesonotum and scutellum clothed with brownish and blackish scales which show a bluish luster, setæ of the scutellum brown; metanotum deep brown with a group of setæ towards the apex; abdomen compressed, black scaled above, beneath creamy white, the colors separated in a straight line on the sides; legs dark with metallic luster, brassy beneath, the middle legs with the tip of the second and succeeding joints silvery white on the inner side; wings with the scales of the veins short and broad on the outer half. Length, 3.5 mm.

One specimen, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from a pupa found in a bamboo joint.

Type.—No. 10860, U. S. National Museum.

DESCRIPTION OF FEMALE OF WYEOMYIA HOSAUTUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather short, swollen apically, vestiture black, with violaceous and bronzy reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish, slightly pruinose; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, blackish, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with iridescent metallic reflection, a white patch at the sides below; two long setæ at vertex and a row of short ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, blackish, with a white tip and base; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales, with bronzy and blue reflection; scales below lateral angles and on front margin whitish; bristles over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, a broad, low median carina, dark-brown, a group of small setæ near posterior margin. Pleuræ dark brown, the coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black with a slight bronzy and blue reflection; venter yellowish white, colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell less than one-half as long as its cell, that of second posterior cell slightly longer than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins rather broadly ligulate, dense and ovate on second to fourth and tip of fifth veins; black, with bronzy reflection on the costa. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflection, femora whitish beneath; tibiæ with pale-brassy luster beneath; brighter on fore tibiæ and their tarsi; hind tarsi bronzy beneath; mid tarsi with the apical two-thirds of second and all of succeeding joints silvery yellowish white on outer side; hind tarsi with fourth and fifth joints white beneath except at their tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

The larvæ live in the water in broken bamboo-joints and in similar locations.

Panama.

Tabernilla, Canal Zone, a single specimen, bred from a pupa found in a bamboo-joint (A. Busck).

WYEOMYIA ABIA Dyar & Knab.

Wyeomyia ochrura Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 227, 229, 1906.
Wyeomyia abia Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 67, 1908.
Wyeomyia abia Theobald, Mon. Culic., v, 626, 1910.

Digitized by Google

ORIGINAL DESCRIPTION OF WYEOMYIA ABIA:

Female.—Proboscis slender, moderately long, much swollen at the apex; palpi dark-scaled; occiput dark-scaled, with obscure blue and green luster, the eyes narrowly margined with dull white scales, the margin interrupted toward the vertex; prothoracic lobes clothed with pearly iridescent scales, the apices without white tips; mesonotum bronzy-scaled, with obscure bluish reflection; abdomen bronzy-scaled above, with bluish reflection, beneath coarsely white-scaled, the colors separated on the sides in a straight line; legs dark-scaled, with bronzy and blue reflections; mid-tarsi with the apical half of the second and all of the third and fourth joints silvery white-scaled on one side; front and hind tarsi unmarked. Length, 3 mm.

Male.—Coloration as in the female.

Two specimens, Dominica, West Indies. (F. E. Campbell.)

Type.—Cat. No. 11988, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA ABIA:

Female.—Proboscis moderate, tip somewhat expanded, labellæ small, rounded, with fine outstanding setæ; vestiture bluish black. Palpi short, flattened, one-sixth as long as the proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, yellowish brown, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded triangular, convex, dark brown, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a bronzy and blue reflection, a small metallic spot at vertex and a large white spot at lower part of sides; two long setæ at vertex and smaller ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat bluish scales, with bronzy luster and broad white tip; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales under lateral angles dull gray, with bluish reflection; setæ over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, a broad, low median carina, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell less than one-half as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant nearly its own length from anterior cross-vein; scales of veins ligulate, rather long, black, with a slight bronzy reflection on the costa, denser and broader on second to fourth veins outwardly. Halteres whitish with black knobs.

Legs moderate, slender, black with a bronzy reflection, the femora whitish beneath; tibiæ and tarsi with a strong bronzy luster beneath; middle tarsi with outer half of second and the third to fifth joints silvery white, except beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Male.—Proboscis brighter bronzy beneath than in the female, becoming silvery toward the base. Palpi slender and very short. Antennæ similar to those of the female, hairs of whorls longer and more abundant. Coloration as in the female. Wings similar to those of the female, the basal cross-vein about its own length from anterior one. Legs marked as in the female; mid tarsi with two unequal, opposed claws, those of the hind tarsi small and nearly equal; formula, 0.0–0.0–0.0.

Length: Body about 3 mm; wing 2.5 mm.

Genitalia: The abdomen of our single male has been lost.

Digitized by Google

Larva, Stage IV (plate 89, fig. 284).—Head subquadrate, rounded anteriorly, posterior angles well marked, the occipital foramen reaching to these angles; antennæ slender, smooth, a minute double hair beyond middle; both pairs of head-hairs double, ante-antennal tufts in fours. Lateral abdominal hairs in twos. Comb of eighth segment of about thirty small, closely-set teeth in a single row which reaches well down toward the ventral line; a single long hair behind. Air-tube fusiform, about five times as long as wide, with rather long single hairs uniformly distributed; terminal hooks stout. Anal segment about as long as wide; dorsal plate with rounded angles; dorsal tuft of two long hairs on each side; lateral hairs single, long; subventral tufts multiple. Anal gills missing in our specimens.

Life history and habits unknown.

Dominica, Lesser Antilles.

Dominica (F. E. Campbell).

The larvæ were at first identified as *Wyeomyia mitchellii* (=*ochrura*). The adults were at first identified as *Wyeomyia grayii* (a species at present unknown to us), but later recognized as a distinct species.

WYEOMYIA PANAMENA Dyar & Knab.

Wyeomyia panamena Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 210, 1907.
Wyeomyia panamena Busck, Smiths. Misc. Colls., quart. iss., lii, 74, 1908.
Wyeomyia panamena Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA PANAMENA:

Proboscis moderately stout, enlarged towards the apex; palpi short, silvery scaled at the apex; clypeus prominent, brown, with fine whitish pubescence; tori yellow with fine silvery pubescence; occiput entirely dark scaled with faint iridescence, white on the lower part of the side; prothoracic lobes large and prominent, well separated, clothed with blackish scales, a patch of whitish ones at the apices, the lower portion whitish scaled; mesonotum and scutellum clothed with brownish scales and bronzy and bluish luster; metanotum pitchy black, with a group of setæ near the apex; abdomen compressed, black scaled above, white beneath, the colors separated in a straight line on the sides; legs entirely dark with metallic luster, beneath the legs are bright bronzy. Length, 4 mm.

One specimen, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from a pupa in a bamboo joint.

Type.—No. 10856, U. S. National Museum.

DESCRIPTION OF FEMALE OF WYEOMYIA PANAMENA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather short, swollen apically, vestiture black with a bronzy and bluish reflection; labellæ small, rounded, with fine outstanding setæ. Palpi slender, flattened, one-fifth as long as proboscis, bronzy or bluish black, with white tips. Antennæ moderate, the joints slender, subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous with a silvery-white pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, silvery pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a white patch below extending a short distance up margin of eyes; two long setæ at the vertex and short ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, blackish brown, with a minute white tip and white base; a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with a submetallic reflection; scales on anterior margin and lateral angles whitish; bristles over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, an obscure median carina, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, the coxæ luteous, clothed with elliptical, flat silvery-white scales.

Digitized by Google

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, colors separated at the sides in a straight line; scales along mid-ventral line somewhat raised.

Wings moderate, hyaline; petiole of second marginal cell over one-third as long as its cell, that of second posterior cell as long as its cell; basal cross-vein close to anterior cross-vein; scales of veins narrowly ovate, black, with bronzy reflection on costa, denser on forks of second and fourth veins and outer half of third, many subtruncate. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflection, femora whitish beneath; tibiæ and tarsi with a strong bronzy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

The larvæ live in the water in bamboo-joints and similar locations.

Panama.

Tabernilla, Canal Zone, May 22, 1907, a single specimen bred from a pupa in a bamboo-joint, associated with *Carrollia iridescens*.

WYEOMYIA AUTOCRATICA Dyar & Knab.

Wyeomyia autocratica Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 227, 230, 1906.

ORIGINAL DESCRIPTION OF WYEOMYIA AUTOCRATICA:

This species is allied to *W. longirostris* Theob., but differs markedly in the structure of the tube and comb. The tube bears a false pecten as in *W. ulocoma* Theob. but otherwise these larvæ are not much alike. The specimen was received from Mr. Urich in Trinidad, bred from Bromelia water with the preceding. Mr. Coquillett did not find the adult different from the foregoing species.

The following is an abstract of the table:

1.	Anal processes equally developed	3
3.	Lateral comb of the eighth segment of many teeth in a long line	4
4.	Comb of teeth in a band, at least in part two rows deep	7
7.	Tube with short spines resembling pecten	8
8.	Pecten of the air tube without preceding hair	*autocratica*

DESCRIPTION OF MALE AND LARVA OF WYEOMYIA AUTOCRATICA (FEMALE UNKNOWN):

Male.—Proboscis moderate, swollen apically, vestiture black with bronzy and bluish reflection, a paler brassy luster beneath, labellæ small, rounded, with fine outstanding setæ. Palpi slender, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with a slight pruinosity; a small secondary whorl towards apices of joints, basal whorls of rather long and abundant hairs. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a margin of white scales behind the eyes, widening to a patch on the lower part of the sides and joining a longitudinal stripe on the vertex which runs to the nape; two long setæ on the vertex and a row of shorter ones along margin of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, blackish brown, with submetallic reflection; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales, with a bronzy and blue reflection, scales on anterior margin and below lateral angles whitish; bristles over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Digitized by Google

Abdomen subcylindrical, compressed basally, expanded apically and with many long dark-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter yellowish white, the colors separated on the sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell one-fourth as long as its cell; that of second posterior cell nearly as long as its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins long, narrowly ovate, broader and denser on second to fourth veins outwardly, black, with bronzy reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black, with bronzy and blue reflection, femora pale beneath; tibiæ and tarsi with a bright-brassy luster beneath; middle tarsi with a pale-brassy luster on outer side of last four joints, becoming silvery white beneath; fore and mid tarsi without pale markings. Mid tarsi with a single long claw, those of the hind tarsi unequal; formula, 0.0–0–0.0.

Length: Body about 2.5 mm.; wing 2.3 mm.

Genitalia (plate 6, fig. 39): Side-pieces over twice as long as wide, tapering to tip, outer angle uniformly produced, leaving clasp-filament as a small spatulate appendage arising from outer third of side-piece; a ridge along middle bears a row of hairs and a long spine, and near the tip is produced into a short prominence bearing two broad, ensiform spines. Clasp-filament small, spatulate, with a spine on each apical angle. Harpes slender, concave, the inner margin thickened, curved at the tip and obscurely dentate. Harpagones slender, curved, crossing to form a basal cone. Unci small, with recurved tips, forming a small basal cone. Basal appendages prominent, each with three long, stout setæ.

Larva, Stage IV (plate 89, fig. 285).—Head rounded, straight on sides, a slight notch at insertion of antennæ, oblique before, narrowly flattened between the down-curved clypeal hooks. Antennæ moderate, slender, smooth, two small hairs beyond middle; three irregular spines and a slender digit at tip. Upper head-tufts double, lower multiple. Mental plate lunate-triangular, with a large prominent central tooth and fourteen on each side, the last one small. Mandible quadrangular; a long filament and a small one before tip; an outer row of cilia from a collar; seven small filaments with divided tips on outer margin; dentition of four teeth on an upright process, the first longest; a flat filament and a row of feathered hairs within; process below short and stout, rather widely furcate, taking the place of the basal angle; a row of hairs on its outer margin and a tuft at tip of each limb; a row of stout hairs within and one at base. Maxilla conically tapered, the suture obsolete; outer half sparsely covered with long, stiff hairs; a row of coarse curved hairs at tip and a single long spine; outer half with a small filament above the middle, a band of hairs at base of palpus and a rounded notch with a small spine near apex. Palpus small, with four rudimentary digits. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter; tracheæ very narrow. Air-tube slender, tapering outwardly, nearly six times as long as wide; a row of long, single hairs on the dorsal and ventral aspects and a series of seven slender, closely placed pecten teeth beyond the base; single teeth finely serrate on one side. Lateral comb of eighth segment of many spines in a large triangular patch; single spine widened at tip, fringed with long spinules. Anal segment as long as wide, the dorsal plate large; dorsal tuft of two pairs of long hairs on each side; two long lateral hairs from the plate; subventral tufts large and stellate. Anal gills missing in our specimen.

The larvæ live in the water between the leaves of epiphytic Bromeliaceæ. Mr. Urich found them associated with *Culex imitator, Wyeomyia telestica,* and *Wyeomyia trinidadensis,* and remarks that all of these are vegetable feeders.

Digitized by Google

Trinidad, British West Indies.

Bred from larvæ in bromelias (F. W. Urich).

The species was characterized from the larva. We have before us a single-bred specimen, and are able to distinguish it from all the other species before us.

WYEOMYIA CARA Dyar & Knab.

Wyeomyia cara Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 264, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA CARA:

Proboscis rather short, swollen towards the apex. Occiput clothed with dark scales, a white margin along the eyes and a longitudinal stripe on the vertex. Prothoracic lobes blackish with dark brown and violet reflections. Abdomen with the colors separated on the sides in a straight line. Wing-scales broadly ovate, their tips obliquely subtruncate, dense on the second and fourth veins. Legs black with bronzy and blue reflections, the tibiæ and tarsi with pale brassy luster beneath, the last two joints of the hind tarsi with silvery luster beneath. Length, 3.5 mm.

One specimen, Trinidad, British West Indies, June, 1905 (A. Busck).

Type no. 12182, U. S. N. M.

DESCRIPTION OF FEMALE OF WYEOMYIA CARA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather short, swollen apically, the vestiture bronzy brown with a blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with an iridescent reflection; a white border behind the eyes joining a patch on lower part of the sides and a longitudinal stripe on the vertex; two long setæ on the vertex and a row of short ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, blackish with a dark-violet reflection, a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; some white scales on anterior margin and below lateral angles; bristles over roots of wings reddish brown. Scutellum trilobate, with the vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ and coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant nearly its own length from anterior cross-vein; scales of veins rather broadly ovate, mostly obliquely subtruncate, dense on second, third, and fourth veins, brown, with bronzy reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflection, femora pale beneath; tibiæ with pale-brassy luster beneath; tarsi with shiny darker luster beneath; on hind tarsi the luster becomes silvery on last two joints. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.8 mm.

Life history and habits unknown.

Trinidad, British West Indies.

June, 1905, a single captured specimen (A. Busck).

Digitized by Google

WYEOMYIA PSEUDOPECTEN Dyar & Knab.

Wyeomyia ulocoma Dyar & Knab (not Theobald), Journ. N. Y. Ent. Soc., xiv, 229, 1906.
Wyeomyia ulocoma Dyar (not Theobald), Proc. Ent. Soc. Wash., viii, 19, 1906.
Wyeomyia pseudopecten Dyar & Knab, Proc. Biol. Soc. Wash., xix, 139, 1906.
Wyeomyia pseudopecten Theobald, Mon. Culic., v, 624, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA PSEUDOPECTEN:

Prothoracic lobes entirely dark; occiput blackish with a lighter brown central stripe; eyes broadly margined with white.

8 specimens, Trinidad, B. W. I. (A. Busck, F. W. Urich).

Type.—Cat. No. 9997, U. S. Nat. Mus.

The larvæ of this form were described as *W. ulocoma* Theob. (Journ. N. Y. ent. soc., xiv, 229, pl. xvi, fig. 73, 1906), following Mr. Coquillett's determination, with which we can not agree after seeing the specimens. *W. ulocoma* was described from Guiana and is, no doubt, a distinct species.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA PSEUDOPECTEN:

Female.—Proboscis rather short, swollen apically, the vestiture black with a bronzy reflection, brighter beneath; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous brown, with a whitish pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded, convex, brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat blackish scales with a metallic reflection, a small white spot at the vertex, narrowly continued along the margin of the eyes and expanded to a patch below; a median longitudinal shade, pale with iridescent reflection; two long bristles at the vertex and a row of shorter ones along margin of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, dark bronzy brown, a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat brown scales with a bronzy and blue reflection; a few pale scales at anterior margin, those below the lateral angles pale with blue luster; setæ over roots of wings black. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ and coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the colors separated at the sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant its own length from anterior cross-vein; scales of veins dense, broadly ovate, tips obliquely subtruncate, brown, with a bronzy reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflection, femora pale beneath, tibiæ and tarsi bright bronzy beneath; mid tarsi with a pale-brassy luster beneath, almost silvery on second and third joints; hind tarsi pale brassy with fourth and fifth joints silvery white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.3 mm.

Male.—Proboscis with a pale brassy luster beneath. Palpi as in female. Antennæ similar to those of the female, the joints with a small secondary subapical whorl, the basal whorls with longer, more abundant hairs than in the female. Coloration similar to the female. Abdomen subcylindrical, somewhat expanded towards tip, with numerous terminal bristles, the claspers conspicuous. Wing narrow, the venation similar to that of the female, the vestiture slightly

Digitized by Google

sparser. Mid tarsi gently arcuate outwardly, with a brilliant brassy luster beneath, second and third joint silvery white on upper side, the last two dark; hind tarsi with the last two joints narrowly silvery beneath, a broad silvery shade at the bases of second and third joints. Mid tarsi with a single large claw, those of hind tarsi unequal; formula, 0.0–0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Genitalia (plate 5, fig. 32): Side-pieces over twice as long as wide, strongly tapered to tip, which is small, inner margin narrowly thickened; a basal lobe similar to side-piece in shape but only one-third as long, bearing two very long, thick hairs, which exceed tip of side-piece. Clasp-filament rather stout, the tip divided into small lobes, the longer one furcate and hairy, the middle one short, with four stout spines, the outer one sharply pointed. Harpes elongate slender, the tips bent and toothed. Harpagones and unci reduced, inconspicuous. A small-pointed hairy lobe on each side. Basal appendages represented by three to five leaf-like setæ on each side.

Larva, Stage IV (plate 90, fig. 286).—Head rounded, hind angles roundedly prominent, forming a right angle between posterior edge of occiput and lateral margin behind antennæ; a very slight incision at base of antennæ; front margin roundedly arcuate. Antennæ small, subcylindrical, smooth, a single hair at outer third; a long spine, two short spines, and a digit on a pedicel at tip. Eyes small, round. Dorsal hairs slight. Mental plate slightly triangular, the front margin nearly straight, with a high central tooth and nine on each side, the penultimate one small, the last still smaller, on middle of perpendicular side. Mandible quadrangular; a long filament and a rudimentary one before tip; an outer row of cilia from a collar; a row of short filaments on outer margin; dentition large, on a strong process, of four teeth, the first the longest; a spine before, a smooth filament and two little feathered hairs within; process below deeply cleft, with long hairs at tip and an irregular row at base; basal angle absent; two rows of long hairs on edge of basal articulation. Maxilla conoidal, divided by a suture; inner half with a large curved tooth at tip and a row of very coarse spines on inner margin, a median row of cilia; a row of hairs at tip running well down the suture; outer half with two conjoined filaments situated subapically next the suture; a small spine on other side. Palpus small, obliquely articulated, with minute terminal digits. Thorax quadrangular, slightly rounded at angles, wider than long; hairs long, lateral ones well developed, the short hairs on disk of thorax in fine stellate tufts. Abdomen slender; lateral hairs multiple on first two segments, double on third to fifth, single on sixth; secondary hairs stellate. Air-tube moderate, about four times as long as wide, slightly tapered beyond base; some single hairs scattered over tube; two or three short spines on posterior margin, resembling pecten, preceded by a single hair. Lateral comb of eighth segment a long patch of spines reaching to near the ventral line, several rows deep, the spines smaller and narrower below; single spine narrow, uniform, rounded at tip, fringed with small spinules which become long at tip. Anal segment as long as broad; dorsal plate reaching well down the sides, spined on posterior edge; dorsal tuft of long hairs; lateral tuft of two long hairs from the angle of the plate; subventral tufts small, stellate. Anal gills long, twice as long as segment, uniform, with rounded tips, all four equal.

The larvæ live in the fluid that collects in the red flower-sheaths of a species of *Heliconia*. Mr. Jennings has found them in heliconias of the type of *H. champneiana* and *H. luteofusca*. The eggs are laid in the uppermost, just opening and still dry flower-sheaths, and hatch when moisture accumulates; this moisture is not of a slimy nature, though occasionally thickened by vegetable detritus. The eggs are laid singly, but in considerable numbers; they are smooth, elliptical, and black. Mr. Busck says that the habits are the same as those of

Digitized by Google

Wyeomyia cacodela, and no doubt all the *Heliconia*-inhabiting species have similar habits.

Northern coast of South America.

Montserrat, Trinidad, June 28, 1905 (A. Busck); Maraval, Trinidad (F. W. Urich); Arima, Trinidad, 1906 (F. W. Urich); Tabernilla, Canal Zone, Panama, April 14, 1909 (A. H. Jennings).

This species was at first determined as *Wyeomyia ulocoma,* a species inhabiting Guiana, and with which we are unacquainted except by Dr. Howard's notes on the type. He reports that the prothoracic lobes are denuded of scales, there is no white margin on the eyes, and the middle feet are without white. The types are evidently in such poor condition that their exact determination is impossible, and the exact position of *Wyeomyia ulocoma* must remain unknown until better material has been obtained from the type locality. It is therefore impossible to say that *Wyeomyia pseudopecten* may not be the same species, although, considering the considerable number of species of *Wyeomyia* that occur in each locality, this seems to us improbable. Moreover, the flower-breeding forms are seldom taken unless bred, and the captured types of *Wyeomyia ulocoma* are more probably of some tree-hole or bromelia-breeding species. We therefore retain the name *Wyeomyia pseudopecten* for the form before us. For some time we considered that this species was confined to Trinidad and did not extend to the mainland; but Mr. Jennings has obtained undoubted *pseudopecten* in the Canal Zone.

This species shows a strong pale-brassy luster on the hind tarsi, appearing almost silvery white in certain lights. This makes it additionally difficult to determine the white tarsal markings. Otherwise *W. pseudopecten* appears to be identical in coloration with the two species which follow (*W. eloisa* and *W. pantoia*); they are, however, abundantly distinct on the characters of the male genitalia.

In the larva, the number of teeth in the false pecten on the breathing tube varies from two to five, and usually differs on the two sides. This is also true of the same structure in the three species which follow (*eloisa, pantoia* and *onidus*). The ante-antennal tufts also vary and may consist of two or three hairs.

WYEOMYIA ELOISA, new species.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA ELOISA:

Female.—Proboscis rather short, swollen apically, vestiture black with a bronzy reflection, brighter beneath; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous brown, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, brown, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat blackish scales with a metallic reflection, a small white spot at the vertex, continued narrowly along eyes and expanded to a patch below, a median longitudinal shade, pale, with iridescent reflection; two long bristles at the vertex and a row of shorter ones along margin of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, dark bronzy brown, a row of setæ along anterior margin. Mesonotum clothed with flat brown scales, with a bronzy and blue reflection; a few pale scales at anterior margin, those below lateral angles pale with blue luster; setæ over roots of wings black. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum

Digitized by Google

elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ and coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the colors separated at the sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant its own length from anterior cross-vein; scales of veins dense, broadly ovate, the tips obliquely subtruncate, brown, with a bronzy reflection on the costa. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflections, femora pale beneath; tibiæ and tarsi bright bronzy beneath; mid tarsi with a pale-brassy luster beneath, hind tarsi with fourth and fifth joints silvery white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.3 mm.

Male.—Proboscis with a pale-brassy luster beneath. Palpi as in the female. Antennæ similar to those of the female, the joints with a small secondary subapical whorl, the basal whorls with longer, more abundant hairs than in the female. Coloration similar to the female. Abdomen subcylindrical, somewhat expanded towards the tip, with numerous terminal bristles, the claspers conspicuous. Wing narrow, the venation similar to that of the female, the vestiture slightly sparser. Mid tarsi gently arcuate outwardly, with a brilliant brassy luster beneath, second and third joints silvery white on upper side, the last two dark; hind tarsi with the last two joints narrowly silvery beneath, a broad silvery shade at base of second and third joints. Mid tarsi with a single large claw, those of hind tarsi unequal; formula, 0.0–0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Genitalia (plate 6, fig. 36): Side-pieces over twice as long as wide, strongly tapered to tip, which is small, inner margin narrowly thickened; a subapical slight lobe bearing two moderately long setæ, which are conjoined on their basal half. Clasp-filament rather stout, the tip divided into small lobes, the longer one furcate and hairy, the middle one short, with four stout spines, the outer one sharply pointed. Harpes elongate, slender, the tips bent and toothed. Harpagones and unci reduced, small. Basal appendages represented by three or four leaf-like appendages on each side borne on a bridge-shaped chitinous bar.

Type: No. 12703, U. S. Nat. Mus.

Larva, Stage IV (plate 90, fig. 287).—Head subquadrate, anterior margin rounded, hind angles roundedly prominent. Antennæ small, uniform, with a small hair near tip, terminal appendages small. Maxillæ with a row of teeth within. Lateral abdominal hairs in twos, the other hairs in coarsely stellate tufts. Lateral comb of eighth segment of many spines in a subtriangular patch; single spine long, a little enlarged at tip, evenly fringed with fine spinules. Air-tube moderate, slightly tapered, about three times as long as wide; a false pecten of three teeth near the base; a hair near base and two beyond pecten and four well-separated ones on the dorsal aspect, all rather short and coarse. Anal segment with a large dorsal plate, spinulated at its posterior margin; dorsal tuft of long hairs; lateral tuft of two long hairs; subventral tufts short and stellate. Anal gills rather long, equal, with broadly rounded tips.

The larvæ live in the fluid that collects in the pale flower-sheaths of *Calathea discolor*. The eggs are laid in the uppermost, just opening, and still dry flower-sheaths, and hatch when moisture accumulates. This moisture is never abundant and is always of a slimy nature. The eggs are laid singly, but in considerable numbers; they are smooth, elliptical, and black.

Digitized by Google

Panama.

Miraflores, Canal Zone, February 8, 1909 (A. H. Jennings); Tabernilla, Canal Zone, April 16, 1909 (A. H. Jennings); Caldera Island, Porto Bello Bay, March 5, 1908 (A. H. Jennings).

The adults are indistinguishable from those of *Wyeomyia pseudopecten* and *Wyeomyia pantoia,* but the male genitalia are easily separable from both and the life habits differ. This species is apparently confined to the flowers of *Calathea discolor,* while the other species mentioned inhabit those of *Heliconia.* The specimen which we quote above from Caldera Island is one of the original types of *Wyeomyia pantoia,* but as it is a female, it is undeterminable from the genitalia, and we quote it here on account of its host plant, which was *Calathea* and not *Heliconia.* In the larva, the number of false pecten-teeth on the air-tube, as in the preceding and following species (*pseudopecten, pantoia* and *onidus*), varies between two and four.

WYEOMYIA PANTOIA Dyar & Knab.

Wyeomyia pantoia Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 262, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA PANTOIA:

FEMALE.—Proboscis moderately long, swollen towards the tip, black-scaled. Occiput entirely dark-scaled. Prothoracic lobes dark-scaled, without light scales at the apices. Abdomen dark-scaled above, white beneath, the colors separated on the sides in a straight line. Legs bronzy brown, the femora pale beneath, the hind tarsi with the last two joints silvery white beneath; fore and mid tarsi without white. Wing-scales broad.

MALE.—Coloration as in the female.

Six specimens, bred from larvæ in flower-cups of *Heliconia* and captured, Tabernilla, Canal Zone, Panama, Caldera Island, Porto Bello Bay, Panama (A. H. Jennings).

Type no. 12055, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA PANTOIA:

Female.—Proboscis rather short, expanded at the tip, the labellæ conically tapered, with fine outstanding setæ; vestiture bronzy black, with pale-bronzy luster beneath. Palpi small, one-sixth as long as proboscis, clothed with bronzy-black scales. Clypeus rounded, convex, dark brown, pruinose. Antennæ moderate, the joints subequal, rugose, coarsely pilose, black; tori subspherical with a cup-shaped apical excavation, dark brown, pruinose; hairs of whorls sparse, moderate, black. Eyes separated by a narrow wedge, bluish black. Occiput clothed with flat appressed scales, black with blue and green reflection, a white patch at the sides below and a narrow margin of white scales along eyes, sometimes obscure or concealed, a median longitudinal pale shade, iridescent and ill-defined; two setæ at the vertex and smaller ones at the sides along the eye-margin.

Prothoracic lobes large, distinctly separated, blackish, clothed with dark-brown scales with a slight submetallic reflection; a white patch below; a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue reflections; bristles over roots of wings dark brown; scales below lateral angles silvery gray. Scutellum trilobate, vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, a well-defined median carina, dark brown, a group of small setæ posteriorly. Pleuræ brown, coxæ luteous, clothed with elliptical silvery-white scales.

Abdomen subcylindrical, with many coarse, dark-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter yellowish silvery white, the colors separated on the sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins

Digitized by Google

dense, broadly ovate, many obliquely subtruncate, black, with a blue reflection on the costa. Halteres largely blackish.

Legs rather long and slender, black, with a bronzy and blue reflection, femora whitish beneath, except at their apices; tibiæ and tarsi with a brighter bronzy luster beneath; hind tarsi silvery white beneath on last two joints. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm; wing 3 mm.

Male.—Proboscis as in the female. Palpi small and slender, smaller than in the female. Antennæ similar to those of the female, the joints with small, secondary subapical whorls, hairs of basal whorls longer and more abundant than in the female. Coloration similar to the female. Abdomen subcylindrical, expanded apically, with terminal series of coarse black bristles; claspers somewhat conspicuous. Wings with venation and vestiture similar to those of the female. Front and mid legs with a strong brassy luster beneath, the hind tarsi colored as in the female. Claws of mid tarsi unequal, the longer ones strongly curved; formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm; wing 2.7 mm.

Genitalia (plate 5, fig. 34): Side-pieces over twice as long as broad, the tips conically tapered; a long hair outwardly towards the tip; basal appendages long, resembling the side-pieces and either approximated to them or fused, a long filament arising from the tip close to insertion of clasp-filament, the tip angled, then expanded and cleft. Clasp-filament with a long slender stem which divides at the tip into three small lobes, outer one smooth, middle one with four teeth, outer one with a row of hairs. Harpes with thickened margins, tips curved, obscurely dentate. Harpagones and unci forming small basal cylinders. Basal appendages represented by four leaf-like setæ on each side.

Larva, Stage IV (plate 90, fig. 288).—Head subquadrate, anterior margin rounded, with distinct angles posteriorly, occipital foramen reaching the angles; upper and lower head-hairs single, the tuft above the mouth double, ante-antennal tuft in threes; antennæ small, uniform, a small hair at outer fourth. Lateral abdominal hairs multiple on first two segments, double on third to sixth. Lateral comb of eighth segment of many spines in a large patch about three rows deep, followed by a single hair. Air-tube about four times as long as wide, subcylindrical, apical third conically tapered; three separated single hairs on dorsal aspect, three on ventral aspect, the two most basal ones separated by a false pecten of two or more stout teeth. Anal segment as long as wide, with a large dorsal plate which is roughened with small spicules on its posterior central portion; dorsal tuft of five long hairs on each side; lateral tuft of two long hairs; subventral tufts moderate, multiple. Anal gills longer than anal segment, stout, rounded at their tips, equal.

The larvæ live in the water in the flower-cups of a species of *Heliconia* with upright flowers. Mr. Jennings obtained them several times in *Heliconia* of the types of *champneiana* and *leuteofusca*.

Panama.

Tabernilla, Canal Zone, May 29, 1908 (A. H. Jennings); February 4, 1909 (L. Espey).

One of the original types of this species proves to belong, judging from the host plant, to *Wyeomyia eloisa*. The captured females are indeterminable, as this and the species *W. pseudopecten* and *W. eloisa* are alike in the female adults. The species may be separated readily by the male genitalia.

In the larva, the number of false pecten-teeth on the air-tube varies between two and four, as in the two preceding and the following species (*pseudopecten, eloisa* and *onidus*); we have failed to find any reliable character for distinguishing the larvæ of these species.

Digitized by Google

WYEOMYIA ONIDUS Dyar & Knab.

Wyeomyia onidus Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 261, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA ONIDUS:

FEMALE.—Proboscis moderately long, swollen at the tip. Occiput dark-scaled, the margin of the eyes narrowly white. Prothoracic lobes dark-scaled without white apices. Abdomen dark-scaled above with bronzy luster, white beneath, the colors separated in a straight line. Legs bronzy brown, the femora pale at base beneath, the hind tarsi with the last two joints silvery white beneath, the white interrupted at the apex of the fourth joint; fore and mid tarsi without white. Wing-scales broad.

MALE.—Coloration as in the female.

Three specimens, bred from larvæ in the flower-cups of *Heliconia*, Tabernilla, Canal Zone, Panama (A. H. Jennings).

Type no. 12054, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA ONIDUS:

Female.—Proboscis rather short, swollen apically, the vestiture black with a bronzy and blue reflection, a stronger bronzy luster beneath; labellæ small, rounded, with fine outstanding setæ. Palpi short, one-seventh as long as proboscis, bluish black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous brown, with a whitish pruinosity; hairs of whorls rather long, sparse, black. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat blackish-brown scales with a metallic reflection; margins of eyes narrowly white-scaled, a white patch on lower part of side; a diffused pale, iridescent, longitudinal line on the vertex; two long setæ at the vertex and shorter ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, blackish brown with a slight blue reflection; a row of setæ along anterior margin. Mesonotum clothed with flat dark-brown scales with a bronzy and blue reflection; bristles over roots of wings black; some pale scales on anterior margin and bluish ones under lateral angles. Scutellum trilobate, vestiture similar to that of mesonotum, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, a trace of median carina, dark drown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with flat silvery-white scales.

Abdomen subcylindrical, truncate apically, the tip with dark bristles; dorsal vestiture black with a bronzy luster; venter silvery white, the colors separated on the sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell one-fourth as long as its cell; that of second posterior cell nearly as long as its cell; basal cross-vein distant about its own length from the anterior cross-vein; scales of veins dense, broadly ovate, tips obliquely subtruncate, brown, with a blue reflection on costa, somewhat denser on forks of second vein. Halteres black, whitish at base of stem.

Legs rather long and slender, the vestiture black with bronzy reflection, the femora pale beneath; tibiæ and tarsi with bright bronzy luster beneath; hind tarsi with last two joints silvery white beneath, the white interrupted at apex of fourth joint; fore and mid tarsi without white markings. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Palpi shorter than in the female, one-eighth as long as proboscis. Coloration as in the female. Antennæ with small secondary subapical whorls of hairs on the joints, basal whorls of longer and more abundant hairs than in the female. Abdomen subcylindrical, slightly expanded at tip, the claspers conspicuous. Wing narrower than in the female, the venation and vestiture much the same. Tibiæ and tarsi with a pale-bronzy luster beneath; the white mark-

Digitized by Google

ings as in the female; mid tarsi with a single claw, those of hind tarsi unequal; formula, 0.0–0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 5, fig. 33): Side-pieces twice as long as wide, the tips conically tapered; a ridge or thickening along the middle runs nearly to the tip, whence arises a large filament which is bent at right angles and expanded on its apical half; a single long seta below, the whole representing a basal lobe, but apparently forming a part of the side-piece. Clasp-filament with long, slender stem, the tip divided into three small lobes, the outer slender and hairy, the middle one slender and bearing four stout teeth, the inner one sharply pointed. Harpes broad, the inner edge thickened, bent at the tip and pointed. Harpagones similar, smaller, their tips touching and forming a basal cone. Unci similar, but still smaller. Basal appendages represented by three or four leaf-like setæ on each side.

Larva, Stage IV (plate 90, fig. 289).—Head subquadrate, anterior margin rounded, posterior angles marked, the occipital foramen reaching to the angles; antennæ slender, smooth, with a minute hair towards the apex; dorsal head-hairs single, the ante-antennal tuft double, as also the ones above the mouth. Lateral abdominal hairs in twos after the second segment. Lateral comb of eighth segment a patch of scales nearly three rows deep; a single hair behind. Air-tube slightly fusiform, rather stout, nearly five times as long as wide; four single hairs on dorsal aspect, two on ventral aspect, between these a row of three stout teeth, resembling pecten; terminal hooks rather small. Anal segment as long as wide, the dorsal plate reaching well down the sides; dorsal tuft of five hairs on each side; lateral tuft of two long hairs; subventral tufts short, multiple. Anal gills missing in our specimens.

The larvæ live in the water in the flower-cups of a species of *Heliconia* similar to *H. champneiana*.

Panama.

Tabernilla, Canal Zone, March 12, 1908 (A. H. Jennings).

Wyeomyia onidus is closely related to *W. pseudopecten, W. eloisa* and *W. pantoia*. The differences indicated in the descriptions of the imagos are slight and unimportant, and should not be relied upon. The male genitalia show, however, that the species are distinct. The larvæ, also, of these four species are practically alike, and such slight variations as exist are individual rather than specific.

WYEOMYIA ADELPHA Dyar & Knab.

Wyeomyia adelpha Dyar & Knab, Proc. Biol. Soc. Wash., xix, 140, 1906.
Wyeomyia adelpha Theobald, Mon. Culic., v, 624, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA ADELPHA:

Prothoracic lobes entirely dark; head dark behind, the eyes with an even white margin; middle legs with white marks on the tarsi.

11 specimens, Esparta, Costa Rica (F. Knab).

Type.—Cat. No. 10,000, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF WYEOMYIA ADELPHA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, shortly swollen apically, the vestiture black with a bronzy reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous brown, with a whitish pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded, convex, brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a small white spot at the vertex, a white patch below, joined by a

Digitized by Google

narrow white border along margin of eyes; two setæ on the vertex, with shorter ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, blackish brown, a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales on anterior margin and lateral angles whitish; bristles over roots of wings brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, weakly carinate, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, somewhat compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the colors separated at sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell less than half as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant its own length from anterior cross-vein; outstanding scales of veins ligulate, becoming narrowly ovate and denser on forks of second and fourth veins and outer half of third, black, with blue reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black, with bronzy and blue reflection, the femora whitish beneath; tibiæ and tarsi with a strong luster beneath; mid tarsi with third and fourth joints silvery white on upper side; hind legs with last two tarsal joints white beneath, except at their tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3.3 mm.

The adults were taken in a deep, shaded ravine, in the daytime, as they came to bite.

Costa Rica.

Esparta, September 18, 1905, adults captured (F. Knab); Zent, 20 miles from Port Limon, September 26, 1905 (F. Knab).

The species mentioned by Mr. Busck under this name will be found treated here as *Wyeomyia euethes*, the determination originally given to Mr. Busck by ourselves having been corrected on further study.

WYEOMYIA GALOA Dyar & Knab.

Wyeomyia galoa Dyar & Knab, Proc. Biol. Soc. Wash., xix, 140, 1906.
Wyeomyia galoa Theobald, Mon. Culic., v, 624, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA GALOA:

Prothoracic lobes entirely dark; head dark behind, the eyes with an even white margin; feet all dark.

3 specimens, Trece Aguas, Alta Vera Paz, Guatemala (Schwarz and Barber).

***Type.*—Cat. No. 10,001, U. S. Nat. Mus.**

DESCRIPTION OF FEMALE AND MALE OF WYEOMYIA GALOA (LARVA UNKNOWN):

Female.—Proboscis moderate, swollen apically, vestiture black with a bronzy and blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-fifth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, with a whitish pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat dark-brown scales with a metallic reflection, a very narrow white border along the eyes joined to a white patch below, two setæ at the vertex and smaller ones along the eye margin.

Prothoracic lobes elliptical, well separated, clothed with flat scales, black, with a dark-blue reflection; a row of setæ on anterior margin. Mesonotum

Digitized by Google

clothed with elliptical, flat dark-brown scales, with a bronzy and blue reflection; scales below lateral angles whitish with a dull-blue luster; hairs at roots of wings black. Scutellum trilobate, with the vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the colors separated at the sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein distant less than its own length from the anterior cross-vein; scales of veins dense, broadly ovate, black, with blue reflection on the costa, those towards apex of wing mostly short and obliquely subtruncate. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflection, the femora whitish beneath; tibiæ and tarsi with a brighter bronzy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.3 mm.; wing 3.3 mm.

Male.—Palpi short, slender, about one-seventh as long as proboscis, colored as in the female. Antennæ similar to those of the female, the joints with small, secondary subapical whorls, the basal whorls of longer and more abundant hairs than in the female. Coloration similar to the female. Abdomen subcylindrical, apical portion expanded, last segment with a marginal series of coarse brown bristles. Wings narrower than in the female, basal cross-vein very close to anterior cross-vein, otherwise similar to the female. Front and mid tibiæ and tarsi bright brassy beneath; hind tibiæ and first three tarsal joints silvery beneath, with a slight bronzy tint, the last two joints pure silvery white beneath. Tarsal claws equal and simple; formula 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Genitalia (plate 4, fig. 23): Side-pieces over twice as long as wide, the tips conically tapered, slightly excavated for insertion of clasp-filament; three long setæ in a line below the middle. Clasp-filament with a very long, slender stem, the tip expanded and divided into three lobes; inner lobe broad, subcircular, fringed with setæ; middle lobe furcate, outer lobe small, bearing two teeth. Harpes slender, bent at tip and obscurely dentate. Harpagones forming a large basal cone. Unci with the tips approximate, forming a smaller basal cone. Basal appendages represented by three small setæ on each side.

The specimens of the larva are too fragmentary and in too poor condition to describe.

The larvæ live in the fluid collected in the flower-bracts of a species of *Heliconia*.

Guatemala.

Cacao, Trece Aguas, Alta Vera Paz, April 15, 1906, larvæ in the flower-cups of a species of *Heliconia* with erect flowers (H. S. Barber).

The specimens discussed by Mr. Busck as this species will be found here treated as *Wyeomyia cacodela*, the identification having been corrected on further study. We are puzzled as to the exact identity of this species, and fear some confusion exists in the material. According to the collector, the specimens were bred from *Heliconia*, and the larvæ are in fact of the type that occurs in that plant; but the male genitalia are those of the bromelia inhabiting species. We base our description upon the adults, and refer to the larvæ and life history upon the authority of the collector for the association, but with doubt and reservation.

Digitized by Google

WYEOMYIA CACODELA Dyar & Knab.

Wyeomyia galoa Busck (not Dyar & Knab), Smiths. Misc. Colls., quart. iss., lii, 72, 1908.

Wyeomyia cacodela Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 265, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA CACODELA:

Proboscis moderate, swollen towards the apex. Occiput clothed with dark scales, a narrow white margin along the eyes. Prothoracic lobes blackish with dull bronzy and blue reflection. Abdomen with the colors separated on the sides in a straight line. Wing-scales broadly ovate, their tips obliquely subtruncate. Legs black with bronzy and blue reflections, without white markings in the female, the male with the mid legs brassy beneath, the hind tarsi with the last two joints silvery white beneath. Length, 3.3 mm.

Three specimens, selected from a series, Tabernilla, Canal Zone, Panama, bred from larvæ in flower-cups of *Heliconia* (A. Busck); Gorgona, Canal Zone, Panama, from flowers of *Heliconia* (A. H. Jennings).

Type no. 12183, U. S. N. M.

This species is very similar to *W. galoa* D. and K., and was so identified by us for Mr. Busck, and published in his report on the mosquitoes of the Canal Zone. The hind feet of the male, however, are differently colored.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA CACODELA:

Female.—Proboscis moderate, swollen apically, vestiture black with a bronzy and blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-fifth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat dark-brown scales with a metallic reflection; a very narrow white border along the eyes, joined to a white patch below; two setæ at vertex, and smaller ones along the eye margin.

Prothoracic lobes elliptical, well separated, clothed with flat scales, black, with a dull bronzy and blue reflection; a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue reflection; scales below lateral angles dull gray with a blue reflection; hairs over roots of wings brown. Scutellum trilobate, with the vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of brown bristles. Postnotum elliptical, prominent, brown, a faint median carina, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the colors separated on the sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins dense, broadly ovate, black, with blue reflection on costa, those towards apex of wing mostly short and obliquely subtruncate. Halteres whitish with black knobs.

Legs rather long and slender, black, with bronzy and blue reflection, femora whitish beneath; tibiæ and tarsi with a brighter bronzy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.3 mm.; wing 3.3 mm.

Male.—Palpi short, slender, about one-seventh as long as proboscis, colored as in the female. Antennæ similar to those of the female, the joints with small secondary subapical whorls, the basal whorls of longer and more abundant hairs than in the female. Coloration similar to the female. Abdomen sub-

Digitized by Google

cylindrical, apical portion expanded, claspers prominent, last segment with a marginal series of coarse yellowish-brown bristles. Wings narrower than in the female, venation and vestiture about the same. Middle tibiæ and tarsi bright brassy beneath; front and hind tibiæ and tarsi bright bronzy beneath, hind tarsi with the last two joints silvery white beneath. Tarsal claws equal and simple; formula, 0.0–0.0–0.0.

Genitalia (plate 6, fig. 35): Side-pieces about twice as long as wide, sharply tapered, with a long seta on outer side, smooth. Clasp-filament stout, much attenuated beyond the middle, with a very stout terminal claw; subapically on outer side is a thick appendage bearing a few hairs at its base, furcate, each fringed with short, thick spines. Basal lobes long, slenderly conical, resembling the side-pieces in miniature, a long, slender filament at tip which widens to a roundedly triangular apex, from the inner angle of which is an elliptical appendage with subdivided tip. Harpes elliptical, small, the tip thickened and bent outward in the form of a stout spine. Harpagones forming a basal cone with central point, unci forming a similar smaller cone. Basal appendages represented by a row of elliptical scales on each side.

Larva, Stage IV (plate 91, fig. 290).—Head subquadrate, anterior margin rounded, with distinct angles behind the eyes; antennæ small, uniform, with a minute single hair near tip; both upper and lower pairs of dorsal head-hairs single; ante-antennal tuft in threes. Lateral hairs of abdomen in fours on third and fourth segments, in threes on fifth, single on sixth. Air-tube rather short, tapering on outer half, over three times as long as wide, the terminal hooks small; four long single hairs on the dorsal aspect, one below near the base, followed by three short spines like false pecten teeth, beyond which are two single short hairs. Lateral comb of eighth segment of about 23 short spines in two partly overlapping rows, the hair behind single. Anal segment longer than wide, with a large dorsal plate strongly spined along its posterior margin; dorsal tuft of four unequal hairs on each side; lateral tuft of two long hairs from the angle of the plate; subventral tufts small, multiple. Anal gills large, long, equal, over twice as long as the segment, the tips broadly rounded.

The larvæ live in the water in the flower-cups of species of *Heliconia* of the type of *H. acuminata*. In one instance Mr. Busck found them associated with *Lesticocampa culicivora*. Mr. Busck says:

"The very specialized larvæ of this species live in the conspicuous red flower-sheaths of a Bihai (*Heliconia*) . . . These flower-sheaths contain but little water and that of a slimy character, but they harbor a number of dipterous and coleopterous insects. The . . . larvæ of the present species are slender, flattened, strongly segmented, with yellow head, short tube, and long anal appendages; they have the ability to move head foremost, more crawling than swimming through the sometimes thick fluid in which they live; they are even able to crawl head first up the sides of the calyx above the fluid, and undoubtedly seek another lower and wetter flower-sheath in this way, if for some reason the sheath in which they are goes dry. . . . The eggs, which are black, smooth, and elliptical, are laid singly, but in large numbers, in the uppermost, just opening, and yet dry flower-sheath, where they await a rain for their development."

Panama.

Tabernilla, Canal Zone, April 28, 1907 (A. Busck); Tabernilla, Canal Zone, May 2, 1907, bred from a larva in water in the prints of horse's feet with *Uranotænia calosomata* (A. Busck); Tabernilla, Canal Zone, larvæ in flower-cup of plantain-like plant (=*Heliconia*), small receptacles with thick, sticky water, May 14, 1905 (A. Busck); Gorgona, Canal Zone, larvæ from "banana bromelia" (=*Heliconia*), February 7, 1908, and from banana-like plants, "cup on flower-

Digitized by Google

stalk green, with red and yellow blush," February 10, 1908 (A. H. Jennings); San Pablo, Canal Zone, February 12, 1908, larvæ in "banana bromelia" (=*Heliconia*) which contained abundant water while the true bromelias were dry (A. H. Jennings).

This species was identified for Mr. Busck as *Wyeomyia galoa,* but further study has caused us to separate this as a distinct species. Mr. Busck's locality for the larvæ, mentioned above, where they are recorded as occurring in water in the prints of horse's feet, is probably erroneous, and due to some confusion of the labels or mixture of the cultures. Mr. Busck's notes mention only the *Uranotænia calosomata* found there, and we think it likely that he would have noticed the sabethine larvæ if they had really occurred in such an unexpected location.

WYEOMYIA BROMELIARUM Dyar & Knab.

Wyeomyia asullepta Dyar & Knab (not Theobald), Journ. N. Y. Ent. Soc., xiv, 227, 228, 1906.
Wyeomyia asullepta Dyar (not Theobald), Proc. Ent. Soc. Wash., viii, 19, 1906.
Wyeomyia bromeliarum Dyar & Knab, Proc. Biol. Soc. Wash., xix, 138, 1906.
Wyeomyia bromeliarum Busck, Smiths. Misc. Colls., quart. iss., iii, 74, 1908.
Wyeomyia bromeliarum Theobald, Mon. Culic., v, 623, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA ASULLEPTA (Dyar & Knab, not Theobald):

Described from Guiana. We have the larvæ from Mr. Urich in Trinidad. The determination seems plausible and we have not rejected it.

The following is an abstract of the table:

1. Anal processes two, the upper pair aborted..... 2
2. Tube and plate with heavy black basal ring..... *asullepta*

ORIGINAL DESCRIPTION OF WYEOMYIA BROMELIARUM:

We propose this term for the larvæ described by us as *W. asullepta* Theob. (Journ. N. Y. ent. soc., xiv, 228, pl. xv, fig. 69, 1906). The single bred adult has, most unfortunately, been nearly entirely destroyed since it was identified by Mr. Coquillett, and we are unable to check the identification. There is no reason, however, to suppose it the same as the continental form, *asullepta.*

Type.—Cat. No. 9989, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA BROMELIARUM:

Female.—Proboscis rather short and stout, swollen apically, vestiture black with a bronzy and blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-fifth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, with silvery-white pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, silvery pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat dark-brown scales with a metallic reflection, a white spot at the vertex, a white patch below, the two joined by a white border along the eyes; two long setæ at the vertex and small ones along margin of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, blackish with bronzy and blue reflection, a patch of silver scales at base; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales on anterior margin white, below lateral angles gray; setæ over roots of the wings brown. Scutellum trilobate, with the vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of brown bristles. Postnotum elliptical, prominent, a broad, low median carina, dark brown, a group of small setæ near the posterior margin. Pleuræ luteous with a dark-brown patch, coxæ luteous, clothed with elliptical, flat, silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the colors separated at the sides in a straight line; scales along mid-ventral line slightly raised.

Digitized by Google

Wings rather narrow, hyaline; petiole of second marginal cell less than one-half as long as its cell, that of second posterior cell about equal to its cell; basal cross-vein almost incident with anterior cross-vein; scales of veins narrowly ovate, black, with blue reflection on the costa, broader and dense on second to fourth veins, mostly with obliquely subtruncate tips. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflection, the femora whitish beneath at base, tibiæ and tarsi with a bright bronzy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Palpi slender and shorter than in the female, about one-seventh the length of proboscis. Antennæ similar to those of the female, the joints with small secondary subapical whorls, the hairs of the basal whorls longer and more abundant than in the female. Coloration as in the female. Abdomen elongate, subcylindrical, somewhat expanded apically, with numerous terminal coarse dark-brown bristles. Wings with the stems of the fork-cells longer than in the female, the basal cross-vein about half its length from the anterior cross-vein. Middle legs with the tarsi arcuated outwardly; tarsi without white markings; middle tarsi with a single claw, those of the hind tarsi slightly unequal; formula, 0.0–0–0.0.

Length: Body about 3.5 mm.; wing 2.7 mm.

Genitalia (plate 3, fig. 12): Side-pieces over twice as long as wide, slender, the tips conically tapered; a single seta on outer aspect and three long ones in a row towards base. Clasp-filament with a slender stem, the tip branching into three lobes; outer lobe erect, serrate, with a long crest at the tip; middle lobe upright, smooth; inner lobe elliptical, projecting at right angles, bearing a row of long hairs outwardly. Basal lobes of side-pieces small, rounded, triangular, setose. Harpes slender, tips approximate, obscurely dentate, the pair forming a large basal cone. Harpagones and unci forming two similar smaller cones. Basal appendages represented by a row of five setæ on each side. Penultimate segment with a rounded hairy prominence at each lateral angle and a smaller prominence within it, also hairy.

Larva, Stage IV (plate 91, fig. 293).—Head rounded, angles slight. Antennæ small, cylindrical, smooth, without perceptible hair; a slender spine and three short ones and a digit on a long, slender pedestal at tip. Eyes small, round. Head hairs slight. Mental plate broadly arcuate from an excavate triangular base; a stout central tooth and nine on each side, all very regular and even, the last one a little more pointed and separated. Mandible quadrangular, slightly spined at the base outwardly; a very long hair from a tubercle basad of the middle; two long filaments and a short one before tip; an outer row of cilia from a collar; a short row of branched filaments on outer margin; dentition of four teeth on a long process, the first the longest; a spine before, two small teeth at base, a narrow filament and row of hairs within; process below long, thick, continuous with the basal angle, slightly widely furcate without, a row of hairs along outer margin; a row of stout divided hairs within; a row of long hairs at base. Maxilla hemispherical, base oblique, no suture; a series of stout curved spines along inner margin, inner half of surface covered with long converging hairs; a round tuft of hairs at tip, with a stout spine with furcate apex on the inner side; a long spine below; two little processes at middle of outer margin. Palpus small, stout, with minute apical digits. Thorax rounded, abdomen slender, the hairs well developed. Air-tube moderate, about three times as long as wide, conically tapered outwardly, a few scattered hairs, mostly single; no pecten, a broad black basal ring. Lateral comb of eighth segment of thirteen or less smooth, thorn-shaped scales in a straight row, preceded by an elongate irregularly elliptical plate. Anal segment about as wide as long, with a dorsal

Digitized by Google

plate reaching well down the sides; dorsal tuft of five long hairs on each side; lateral tuft of three long hairs; small subventral stellate tufts; no ventral brush; a broad black band at base of plate. Anal gills two, broad, moderate, the other pair vestigial.

The larvæ live in the water in bamboo-joints and similar locations.

Trinidad, British West Indies, and Panama.

Trinidad (F. W. Urich); San Juan, Trinidad, larvæ in bamboo-joints (F. W. Urich); Tabernilla, Canal Zone, Panama, May 21, 1907, larvæ in bamboo-joints, and May 22, 1907, larvæ in bamboo-traps (A. Busck).

Our specimens from Trinidad were originally determined as *Wyeomyia asullepta* Theobald, a species described from British Guiana. Dr. Howard has examined the types of *W. asullepta* in the British Museum and reports that the prothoracic lobes are denuded, that there is no white margin visible behind the eyes, nor white on the tarsi of the mid legs. The species is, therefore, undeterminable from the type, and we feel obliged to consider the form before us distinct, until the contrary can be proven by fresh material. The name *Wyeomyia bromeliarum* is unfortunate, as this is one of the species of *Wyeomyia* that does *not* live in the leaves of Bromeliaceæ, but we can not change the name now. We possess but a single specimen of the adult, a female, from Trinidad, and two specimens, both males, from Panama. We have considered them to be conspecific, as no differences are obvious in the adults, but the localities are remote, and the material insufficient. Moreover, the larvæ present certain differences, apparently of specific value, more particularly in the shape of anal plate (compare Journ. N. Y. Ent. Soc., xiv, plate xv, fig. 69,* larva from Trinidad and our present figure, plate 91, fig. 293, larva from Panama); but we feel averse to dividing the species on the present material. The name *Wyeomyia bromeliarum* pertains to the Trinidad form; the Panama form will receive a new name if further material should indicate it.

WYEOMYIA AGYRTES Dyar & Knab.

Wyeomyia agyrtes Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 265, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA AGYRTES:

Proboscis rather short, swollen towards the apex. Occiput clothed with dark scales, the eyes with a narrow white margin. Prothoracic lobes blackish, a white patch below. Abdomen with the colors separated on the sides in a straight line. Wing-scales broadly ovate, their tips obliquely subtruncate, dense. Legs black with bronzy and blue reflections, front and mid legs bright bronzy beneath, without white markings in the female. Length, 3.5 mm.

One specimen, Tabernilla, Canal Zone, Panama, bred from larvæ taken May 16, 1905, in water in a bamboo stump (A. Busck).

Type no. 12184, U. S. N. M.

DESCRIPTION OF FEMALE OF WYEOMYIA AGYRTES (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather short and stout, swollen apically, vestiture black with a bronzy and blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, pruinose; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat dark-brown scales with bronzy and blue reflections, a pale spot at the vertex, a white patch below, the two joined by a white border behind the eyes; two long setæ at the vertex and small ones along margins of eyes.

* The peculiar plate at the base of the comb is present in the Trinidad larvæ as well as in the Panama ones. It was omitted from the figure of the Trinidad larva, as, at the time, Mr. Knab thought it to be a malformation.

Digitized by Google

Prothoracic lobes elliptical, well separated, clothed with flat scales with slight bronzy and blue reflection, a patch of silver scales at base; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue reflections; scales under the lateral angles dark gray with a blue reflection; bristles over roots of wings black. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, luteous brown, a group of small setæ near posterior margin. Pleuræ and coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, somewhat compressed, truncate apically, and with many long brown terminal bristles; dorsal vestiture black with a slight metallic reflection; venter yellowish white, colors separated at the sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant slightly less than its own length from anterior cross-vein; outstanding scales of veins dense, broadly ovate, obliquely subtruncate, black, with a blue reflection on the costa. Halteres black, with base of stem white.

Legs rather long and slender, black, with bronzy and blue reflection, the femora whitish at base beneath; tibiæ and tarsi with a bright bronzy luster beneath, less marked on hind legs. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Life history and habits unknown.

The specimen bears a breeding-number, but the skin preserved is that of a *Culex*. It appears from the notes that this *Wyeomyia* remained unnoticed in the cyanide bottle until the *Culex* was killed. Both specimens were given the same number by the collector, as he did not know to which it belonged. Unfortunately, therefore, the larva of the *Wyeomyia* was missed.

Panama.

Tabernilla, Canal Zone, May 16, 1907 (A. Busck).

WYEOMYIA PERTINANS (Williston) Theobald.

Ædes pertinans Williston, Trans. Ent. Soc. Lond., 271, 1896.
Ædes pertinans Giles, Gnats or Mosq., 352, 1900.
Wyeomyia pertinans Theobald, Mon. Culic., ii, 272, 1901.
Wyeomyia pertinans Giles, Gnats or Mosq., 2 ed., 498, 1902.
Ædes pertinans Giles, Gnats or Mosq., 2 ed., 483, 1902.
Wyeomyia pertinans Blanchard, Les Moustiques, 424, 1905.
Wyeomyia pertinans Dyar & Knab (in part), Proc. Biol. Soc. Wash., xix, 168, 1906.
Wyeomyia pertinans Theobald, Mon. Culic., v, 580, 1910.

ORIGINAL DESCRIPTION OF AËDES PERTINANS:

♂, ♀. Face, basal joints of antennæ and base of proboscis yellowish; antennæ and proboscis otherwise nearly black, the former only a little more hairy in the male than in the female, the terminal joint of the male only a little longer than the preceding ones. Mesonotum brown, thickly covered with dark brown squamulæ; pleuræ yellow, with white tomentum. Abdomen deep brown, with brown squamulæ; venter yellow, with white squamulæ; male forceps small, yellow. Legs deep brown; the femora, and, in a less degree, the tibiæ showing the yellow ground-colour on the underside. Wings nearly hyaline; veins uniformly brown squamulate. Length 3 mm.

Six specimens. Sea level and 1000 feet.

DESCRIPTION OF FEMALE OF WYEOMYIA PERTINANS (MALE AND LARVA UNKNOWN):

Female.—Proboscis wanting in the specimen before us. Palpi short, flattened, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with a whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, brown, pruinose. Eyes separated at the vertex by a rather broad wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection; a narrow border along the eyes, widening into a patch

Digitized by Google

below, white; two setæ at the vertex and a row of small ones along margin of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, dark brown with slight bronzy and blue reflection, the base silvery; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales below lateral angles dull bluish gray, setæ over roots of wings brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long, dark-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter yellowish white, colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant much less than its own length from anterior cross-vein; outstanding scales of veins ligulate, black, with bronzy reflection on costa, broader and denser on second to fourth veins apically. Halteres whitish with black knobs.

Legs rather long and slender, black, with a bronzy and blue reflection, the femora whitish beneath at base; tibiæ and tarsi with a stronger bronzy luster beneath; tarsi without white markings. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Life history and habits unknown.

St. Vincent, West Indies (S. W. Williston).

Professor Williston has kindly presented us with one of his types, a female. The species was described in *Aëdes*, but belongs to *Wyeomyia*. Professor Williston has inadvertently reproduced the figures of antennæ and hypopygium of this sabethine as typifying those structures for the genus *Aëdes* (Man. No. Am. Dipt., 3 ed., p. 27, fig. 3, and p. 36, fig. 4).

WYEOMYIA GRAYII Theobald.

Wyeomyia grayii Theobald, Mon. Culic., ii, 269, 1901.
Wyeomyia grayii Theobald, Mon. Culic., iii, 311, 1903.
Wyeomyia perturbans Blanchard (not Williston), Les Moust., 424, 1905.
Wyeomyia grayii Theobald, Mon. Culic., v, 580, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA GRAYII:

Thorax testaceous-brown, with dusky scales; pleurae ochraceous, densely clothed in parts with broad white scales. Abdomen dusky black above; venter ochraceous. Legs black, coxae and venter of the femora ochraceous; ungues of the ♀ equal and simple; metanotum with four chaetae placed quadrangularly; proboscis not quite as long as thorax and abdomen.

♀. Head covered by flat broad scales, dull purplish in the middle, ochraceous at the sides, and white between the eyes; in some specimens the ochraceous scales border the eyes as well; clypeus ochraceous-brown; antennae almost black, with pale pubescence, short, only a little more that half the length of the proboscis, hairs long, bases of the joints with narrow pale bands; palpi short, black scaled; proboscis black, long, and thin, swollen at the tip, nearly as long again as the antennae, apex pilose; eyes deep purplish-black.

Thorax testaceous-brown, covered with flat, spindle-shaped, dusky-black scales; over the roots of the wings and along the posterior part of the mesonotum are thickly spread flat dusky-black scales, of similar form to the flat head scales; bristles black; scutellum ochraceous, with four long black bristles and two very small ones to the central lobe, with overlapping flat dusky scales, which on the lateral lobes form a small black patch; the lateral lobes have large and small black bristles; metanotum bright brown, with purplish reflections, and with a little tuft of bristles on its posterior half, arising from black spots, so that their presence can always be detected even if the bristles have gone; these bristles are arranged near the apical end of the metanotum quadrangularly, one bristle marking each corner, the two

Digitized by Google

lowest being rather nearer together than the two uppermost chaetae; pleurae paler yellowish to ochraceous, densely clothed in parts with short, broad, white scales.

Abdomen covered with dusky-black scales, with the posterior borders of the segments with very minute border-bristles; venter ochraceous, clothed with pale, almost creamy-yellow scales.

Legs long, black; coxae very pale, and also the ventral surface of the femora; knee spot small and pale; hind metatarsi longer than the hind tibiae; ungues equal and simple.

Wings with the veins clothed with umber-brown scales, the stem of the fourth with long thin scales on one side, also the branches of the second to fifth and the base of the second; first sub-marginal cell longer and a little narrower than the second posterior cell, its base considerably nearer the base of the wing than the base of the latter, stem about one-third the length of the cell; stem of the second posterior cell rather more than two-thirds as long as the cell; posterior cross-vein about its own length distant from the mid cross-vein; the marginal transverse vein joins second long vein sharply and at an obtuse angle, the vein being carried a little way beyond it and scaled. Halteres ochraceous, with a deep fuscous knob.

Length.—3 to 3.5 mm.; of hind legs 8.5 mm.

Habitat.—Castries, St. Lucia (St. George Gray, 1. 2. 1900); Grenada (Broadway) (63).

Time of capture.—December 25 (St. Lucia); February (Grenada).

Observations.—Some specimens were taken at an elevation of 1000 feet at 2 P. M., at a place called Piton, Flore Farm, in the forest in St. Lucia.

This species comes in my new genus, for which Professor Lankester proposed the name *Wyeomyia*, the distinguishing character being the metathoracic bristles.

It is a solitary species, and is very common where it occurs (in St. Lucia). Specimens sent by Mr. Broadway from Grenada, taken on the Ballast Ground during February, differ slightly from the St. Lucia specimens. The head scales are more ochraceous and the posterior cross-vein is slightly nearer the mid than in the St. Lucia specimens. They are not distinct, however, as far as I can see.

This may be Williston's *Aëdes perturbans*. But I have not yet seen specimens from St. Vincent. The description, however, would apply to this as well as to one or two other species. It is closely related to the species I take to be *Aëdes* (*Wyeomyia*) *pertinans* of Williston, but differs from it in the disposition of the metathoracic chaetae and in the position of the cross-vein and fork-cells.

There are no specimens of this species in the collection of the U. S. National Museum. It can not be a synonym of *Wyeomyia pertinans*, as suggested by the describer, although there is nothing in the description to contradict this reference; but Dr. Howard has examined the type and reports that the mid tarsi are marked with white, which is not the case with *Wyeomyia pertinans*. The prothoracic lobes are denuded, and the type is in such poor condition that we are unable to definitely place the species from present information.

WYEOMYIA GLAUCOCEPHALA Dyar & Knab.

Wyeomyia glaucocephala Dyar & Knab, Proc. Biol. Soc. Wash., xix, 140, 1906.
Wyeomyia glaucocephala Theobald, Mon. Culic., v, 624, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA GLAUCOCEPHALA:

Prothoracic lobes entirely dark; occiput green and blue, the eyes with a white margin which narrows centrally.

7 specimens, Santo Domingo, W. I. (A. Busck).

Type.—Cat. No. 9999, U. S. Nat. Mus.

The larva of this species was included with the larva of *W. ulocoma* in our description, cited above. They are doubtless similar; but perfect material will probably enable them to be separated.

DESCRIPTION OF FEMALE OF WYEOMYIA GLAUCOCEPHALA (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, slightly swollen apically, vestiture black with a bronzy and blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-seventh as long as the proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown with whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, brown, slightly pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection;

Digitized by Google

a small silvery spot at vertex, a white patch below, running up as a white border along the eyes, not reaching the vertex; two setæ at the vertex and small ones along margin of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, black, with violaceous and bronzy reflection; a row of setæ along margin. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy-blue reflection; scales on anterior margin whitish, those below lateral angles dull gray with bluish reflection, setæ over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, truncate apically and with many long, dark brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter yellowish white, colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins ligulate, black, with blue reflection on costa, denser and slightly broader on second to fourth veins outwardly. Halteres whitish with black knobs.

Legs moderate, slender, black with bronzy and blue reflection, the femora basally whitish beneath; tibiæ and tarsi with a strong bronzy luster beneath; mid tarsi with apical third of second and all of third, fourth, and fifth joints white on outer side. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.8 mm.

The specimens of the larva are in too poor condition to describe.

The larvæ live in the water between the leaves of epiphytic Bromeliaceæ and in similar situations. Mr. Busck got them in the "leaf-corner of a parasitic pineapple-plant high up on a tall tree," and again in the leaf-sheaths of a young palm. He also captured several specimens that came to bite in the daytime.

Santo Domingo.

San Francisco Mountains, August 17, 1905, larvæ in plant on a tree and in leaf-corners of a young palm (A. Busck).

WYEOMYIA TELESTICA Dyar & Knab.

Wyeomyia telestica Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 227, 230, 1906.

ORIGINAL DESCRIPTION OF WYEOMYIA TELESTICA:

The larva is allied to *W. ochrura* D. & K., described above. It was sent to us by Mr. Urich from Trinidad, bred from Bromelia water. The adults were named "*Dendromyia quasiluteoventralis* Theob." by Mr. Coquillett.

The following is an abstract of the table:

1.	Anal processes equally developed	3
3.	Lateral comb of the eighth segment of many teeth in a long line	4
4.	Comb of a long row of single teeth, nowhere doubled	5
5.	Tube with coarse single hairs, all pale	6
6.	Air tube 5 × 1; spines of comb scales longer than the base	*telestica*

DESCRIPTION OF MALE AND LARVA OF WYEOMYIA TELESTICA (FEMALE UNKNOWN):

Male.—Proboscis moderate, swollen apically, vestiture black with a bronzy and blue reflection; beneath with a pale-brassy luster, silvery towards base; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, slender, one-seventh as long as proboscis, bronzy black. Antennæ moderate, joints slender, subequal, rugose, coarsely pilose, black, the joints with small secondary subapical whorls; tori subspherical with a cup-shaped apical excava-

Digitized by Google

tion, brown, with whitish pruinosity; hairs of whorls long, rather abundant, black. Clypeus rounded, convex, luteous brown, pruinose. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a bronzy and blue reflection, a small white spot at the vertex, a white patch below, a white border along the eyes not attaining the vertex; two setæ on the vertex and smaller ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, black with a blue reflection; a row of setæ along the anterior margin. Mesonotum clothed with elliptical, flat brown scales, with a bronzy and blue reflection; scales below the lateral angles and some on front margin whitish; setæ at roots of wings black. Scutellum trilobate, with the vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, an obscure median carina, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, expanded apically and with many long, dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white. the colors separated at the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein distant slightly less than its own length from anterior cross-vein; outstanding scales of veins long, ligulate, denser and rather narrowly ovate on second and fourth veins outwardly, black, with a blue reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflection, femora whitish beneath; tibiæ and tarsi of front and hind legs with a bronzy luster beneath; of the mid legs with a paler luster, tips of second tarsal, the third and fourth white on the outer side. Mid tarsi with two claws, unequal, subopposed, those of hind tarsi small, subequal; claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Genitalia (plate 4, fig. 24): Side-pieces over twice as long as wide, the tips conically tapered; three setæ in a line towards base; basal lobes rounded triangular, setose. Clasp-filament with a long, slender stem, the tips expanded into a lobed clasp; middle lobe very broad, with a truncate tip, one angle of which is expanded into a short subquadrate limb, both it and the tip fringed with setæ; outer lobe a small, broad appendage with dentate tip and a row of setæ; inner lobe small, and bearing a stout, erect spine. Harpes rather slender, bent at the tip and obscurely dentate. Harpagones and unci forming small basal cones. Basal appendages represented by two stout setæ on each side.

Larva, Stage IV (plate 91, fig. 292).—Head rather squarely rounded, nearly straight on sides, a slight notch at insertion of antennæ, front margin arcuate, ante-antennal tuft multiple. Antennæ small and slender, with a fine tuft at outer third; at tip, a long spine, three shorter ones, and a long digit with a basal branch. Mental plate triangular, with a long, prominent central tooth and eleven evenly spaced ones on each side, the basal one smaller and sharper. Mandible quadrangular, with slight spines outwardly towards base; a filament from a notch before tip; an outer row of cilia from a collar; a row of prominences on outer margin with divided tips; dentition of four teeth on a process, the first the longest; a spine before, a double tooth at base, a short filament and a row of slender processes with divided tips within; process below short, widely furcate, taking the place of the basal angle, a row of hairs along margin and a tuft at tip of each limb; a row of hairs within and one at base. Maxilla elongate hemispherical, divided by a weak suture; inner half with a row of

Digitized by Google

short, stout spines on margin and dense cilia within; a tuft of hairs at tip and a long, articulated spine; outer half with a single filament at outer fourth and a band of hair between it and base of palpus; a short spine on margin from a slight notch. Palpus small, with four rudimentary digits. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter; lateral hairs in fours on second segment, in twos on third to sixth, single on seventh; short hairs in stellate tufts. Air-tube straight, tapered on outer half, over five times as long as wide; two irregular rows of single hairs and a triple tuft near base behind. Lateral comb of eighth segment of twenty-two spines in a straight row; single spine elongate, with a pointed tip, very faintly fringed with spinules. Anal segment longer than wide, with a dorsal plate reaching well down the sides; dorsal tuft of two long hairs on each side; a single, long lateral hair; a stout stellate subventral tuft. Anal gills four, subequal, longer than the segment, bluntly pointed.

The larvæ live in water in the leaves of epiphytic Bromeliaceæ. Mr. Urich obtained them associated with *Wyeomyia trinidadensis, Wyeomyia autocratica,* and *Culex imitator.*

Trinidad, British West Indies (F. W. Urich).

Our specimen was at first determined as *Wyeomyia quasiluteoventralis* and later the larva was made the basis of the name *Wyeomyia telestica.* Dr. Howard has examined the type of *Wyeomyia quasiluteoventralis,* and reports that it has coppery-golden prothoracic lobes. It therefore has nothing to do with the present species, which has black lobes.

WYEOMYIA CHRESTA Dyar & Knab.

Wyeomyia chresta Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 263, 1909.
Wyeomyia adelpha Busck (not Dyar & Knab), Smiths. Misc. Colls., quart. iss., lii, 72, 1908.

ORIGINAL DESCRIPTION OF WYEOMYIA CHRESTA:

FEMALE.—Proboscis rather long and slender, distinctly swollen at the tip. Occiput dark-scaled, the eyes with a narrow white margin, interrupted subdorsally. Prothoracic lobes dark, white below; abdominal colors separated on the sides in a straight line. Wing-scales large, ovate. Legs black, the mid tarsi with tip of second joint, third and fourth white below, hind tarsi with bases of second and third narrowly white, fourth and fifth white below except at tips.

Two specimens, Tabernilla, Canal Zone, Panama (A. Busck).

Type no. 12135, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA CHRESTA:

Female.—Proboscis rather slender, the tip expanded, the labellæ small, rounded, with fine outstanding setæ; the vestiture black, with bronzy luster, beneath with bright bronzy luster nearly to the tip. Palpi short, flattend, one-seventh as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown with whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, subtruncate in front, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a bronzy and blue reflection, a small metallic spot at the vertex and a large white spot at lower part of side, a narrow white margin running up along the eyes, not attaining the vertex; two setæ at vertex and smaller ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat blackish scales with bronzy luster, a row of setæ on the anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue reflections; scales below the lateral angles silvery gray, some white ones on anterior margin; bristles over roots of wings dark brown. Scutellum trilobate, with the vestiture

Digitized by Google

similar to and continuous with that of mesonotum, each lobe with a small tuft of dark-brown bristles. Postnotum elliptical, prominent, dark brown, a group of setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long, dark-brown terminal setæ; dorsal vestiture black with a slight metallic reflection; venter yellowish white, colors separated at sides in a straight line; the scales somewhat raised along the mid-ventral line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell; that of second posterior cell about equal to its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins ligulate, long, becoming broader and subcuneiform and denser on apical half of forks of second and fourth veins and apex of third, black, with a blue reflection on the costa. Halteres whitish with black knobs.

Legs rather long and slender, black, with a bronzy reflection, the femora whitish beneath; tibiæ and tarsi with a strong bronzy luster beneath; mid tarsi with tip of second and all of third and fourth joints silvery white on outer side; hind tarsi with first three joints narrowly silver-marked at base beneath, last two joints silvery beneath at basal two-thirds. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Proboscis bronzy beneath, becoming silvery towards base. Palpi small and slender. Antennæ similar to those of the female, the joints with a small secondary subapical whorl, hairs of basal whorls longer and more abundant than those of the female. Coloration similar to the female. Abdomen rather long and slender, compressed, considerably expanded towards tip, the claspers visible between the lateral series of long bristles. Wing with the stems of the fork-cells slightly longer than in the female, basal cross-vein about its own length from anterior one; vestiture similar. Legs with a brilliant brassy luster beneath on front and middle pair; middle legs slightly shorter than the front ones, the tarsi with a diffused silvery luster on upper side of apical half of third and on fourth joints; hind legs with a bronzy luster beneath, the first three tarsal joints with a silvery mark at the bases beneath, the last two joints with their basal two-thirds white. Mid tarsi with a single large curved claw, hind tarsi with two unequal ones; formula, 0.0–0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 4, fig. 25): Side-pieces over twice as long as wide, the tips conically tapered; three long setæ in a line towards the base. Clasp-filament with a long, slender stem, the tip expanded into a lobed clasp; middle lobe very large, roundedly quadrate, with marginal rows of setæ and one across the middle; a small, rigid thickening near the base; inner lobe short, broad, squarely truncate at tip; outer lobe elliptical and bearing a long, erect spine. Basal lobes of side-piece roundedly triangular, setose. Harpes slender, elliptical, inner edge thickened, bent at tip, and obscurely dentate. Harpagones and unci similar, forming small basal cylinders. Basal appendages represented by two short setæ on each side.

Larva, Stage IV (plate 91, fig. 291).—Head well rounded, without lateral angles; antennæ rather long, slender, with a single hair beyond the middle; head-tufts both double, ante-antennal tuft in threes. Lateral abdominal hairs in sixes on first two segments, double on third to sixth. Comb of eighth segment of about sixteen teeth in a single straight row; a long double tuft behind. Air-tube fusiform, about four times as long as wide, with single hairs well distributed over dorsal aspect, a row of single hairs along ventral aspect; terminal hooks moderate. Anal segment longer than wide, the dorsal plate

Digitized by Google

reaching well down the sides; dorsal tuft of two long hairs on each side; lateral hair single, long, arising from angle of plate; subventral tuft short, multiple. Anal gills about as long as the segment, stout, with rounded tips, equal.

The larvæ live in water between the leaves of epiphytic Bromeliaceæ. Mr. Busck found the larvæ "in true *Bromelia* water on a calabash tree near town."

Panama.

Tabernilla, Canal Zone, July 22, 1907, larvæ in bromelia water (A. Busck).

WYEOMYIA ABRACHYS Dyar & Knab.

Wyeomyia abrachys Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 262, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA ABRACHYS:

FEMALE.—Proboscis rather long, distinctly swollen towards the tip. Occiput dark-scaled, the eyes with a narrow whitish margin. Prothoracic lobes black above, the tips shining but not distinctly white, the lower part white-scaled. Abdomen dark above, white below, the colors separated on the sides in a straight line. Wing-scales narrow, spatulate, broader and denser at the tip. Legs black-scaled, the mid tarsi with the fourth joint distinctly white beneath in the female, the third and fourth joints white in the male, hind tarsi with white bands at the bases of the second and third joints, the fourth and fifth white below except at tip.

Three specimens, Caldera Island, Porto Bello Bay, Panama (A. H. Jennings).

Type no. 12133, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA ABRACHYS:

Female.—Proboscis rather slender, tip expanded, labellæ small, rounded, with fine outstanding setæ; vestiture black with bronzy luster, beneath with a brassy luster nearly to tip. Palpi short, flattened, one-seventh as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brown, with whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a bronzy and blue reflection, a small metallic spot at the vertex and a large white spot at lower part of side; a narrow white margin running up along the eyes, not attaining the vertex; two setæ at the vertex and smaller ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat blackish scales with a bronzy luster, a pale reflection at tip, the base silvery scaled; a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue reflection; scales below lateral angles silvery gray, some white ones on anterior margin; bristles over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of dark-brown bristles. Postnotum elliptical, prominent, with a broad, low, median carina, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many long dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, colors separated on sides in a straight line; the scales somewhat raised along the mid-ventral line.

Wings rather narrow, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins long, ligulate, becoming broader, denser and subcuneiform on apical half of forks of second and fourth veins and outer part of third, black, with a blue reflection on the costa. Halteres whitish with black knobs.

Digitized by Google

Legs rather long and slender, black with a bronzy reflection, the femora whitish beneath; tibiæ and tarsi with a strong bronzy luster beneath; mid legs with strong brassy luster beneath, third and fifth tarsals with a pale-bronzy luster on outer side, fourth joint silvery on outer side; hind tarsi with bases of the first three joints narrowly silvery beneath, the last two white beneath except at the tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.8 mm.

Male.—Proboscis pale bronzy beneath, becoming silvery towards base. Palpi small and slender. Antennæ similar to those of the female, the joints with a small secondary subapical whorl, the hairs of the basal whorls longer and more abundant than in the female. Coloration similar to the female. Abdomen rather long and slender, compressed, considerably expanded towards tip, the claspers visible between the lateral series of long bristles. Wings with the stems of the fork-cells slightly longer than in the female. Front and mid legs with a brilliant brassy luster beneath; mid legs slightly shorter than front ones, outer half of second and all of third and fourth tarsals silvery white on outer side; hind legs with tibiæ silvery beneath to near apex, tarsi marked as in the female. Mid tarsi with a single claw, those of hind tarsi subequal; formula, 0.0–0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 5, fig. 26): Side-pieces over twice as long as wide, the tips conically tapered; three long hairs in a line towards base. Clasp-filament with a long, slender stem, the tip expanded and divided into three lobes; middle lobe broad, with a truncate excavate tip, bearing rows of marginal setæ and a row across the middle; outer lobe long and slender; inner lobe slender, bearing a sharp, erect spine. Basal lobes of side-piece rounded triangular, setose. Harpes slender, elliptical, with thickened margin, the tip bent and obscurely dentate. Harpagones and unci similar but smaller, forming basal cones. Basal appendages represented by three stout setæ on each side.

Larva, Stage IV (plate 91, fig. 294).—Head rounded, almost circular in outline, without lateral angles; antennæ rather long, slender; upper head-hairs triple, lower ones single, ante-antennal tuft triple. Lateral abdominal hairs in twos after second segment, single on seventh segment. Comb of eighth segment of about thirty fine, closely set teeth in a long, single row, reaching nearly to the ventral line; a stellate tuft and a long two-haired tuft behind. Air-tube fusiform, about five times as long as wide, with single hairs rather uniformly scattered over the surface; terminal hooks moderate. Anal segment longer than wide, the dorsal plate reaching well down the sides; dorsal tuft of two long hairs on each side; lateral hair single, arising from the angle of the plate; subventral tufts short, stellate. Anal gills about as long as the segment, stout, with rounded tips, equal.

The larvæ live in water between the leaves of epiphytic Bromeliaceæ, Mr. Jennings found them in a bromelia on a fallen tree near a brook.

Panama.

Caldera Island, Porto Bello Bay, January 2, 1908, larvæ from a bromeliad (A. H. Jennings).

WYEOMYIA SYMMACHUS Dyar & Knab.

Wyeomyia chalcocephala Busck (not Dyar & Knab), Smiths. Misc. Colls., quart. iss., lii, 74, 1908.

Wyeomyia symmachus Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 262, 1909.

Wyeomyia euethes Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 263, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA SYMMACHUS:

FEMALE.—Proboscis moderately long, somewhat swollen at the tip, black-scaled. Occiput dark-scaled, the eyes with a narrow white margin, interrupted towards the vertex. Prothoracic lobes dark-scaled, the tips silvery white, as also the basal por-

Digitized by Google

tion. Abdomen black-scaled, with bluish iridescence, white beneath, the colors separated on the sides in a straight line. Legs bronzy brown, the femora pale beneath; hind tarsi with the last two joints white-scaled beneath nearly to their apices; mid tarsi with the apical three-fourths of the second, and all of the succeeding joints silvery white-scaled beneath; fore legs dark. Wing-scales broad.

MALE.—Unknown.

Two specimens, bred from larvæ in water in bamboo joints, Tabernilla, Canal Zone, Panama (A. H. Jennings).

Type no. 12056, U. S. N. M.

ORIGINAL DESCRIPTION OF WYEOMYIA EUETHES:

FEMALE.—Proboscis rather short and stout, distinctly swollen at the tip. Occiput dark-scaled, the eyes with a narrow white margin. Prothoracic lobes dark, white below, without a distinct white tip. Abdomen dark above, white below, the colors separated on the sides in a straight line. Wing-scales large, ovate. Legs black, the mid tarsi with the tip of the second, the third to fifth joints white below, hind tarsi with the fourth and fifth joints white below except at tip.

One specimen, Tabernilla, Canal Zone, Panama (A. Busck).

Type no. 12134, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA SYMMACHUS:

Female.—Proboscis moderate, the tip expanded, the labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints subequal, coarsely pilose, black; tori subspherical, with a cup-shapel apical excavation, brown, with whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, blackish, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a bronzy and blue reflection, a small white spot at the vertex and a large white spot at lower part of side; a narrow white margin running up along the eye, not, but nearly attaining the vertex; two long setæ at the vertex and smaller ones along margin of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat blackish scales with bronzy luster, a silvery patch at base; a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue reflections, scales below lateral angles silvery gray, some white ones on anterior margin; bristles over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a broad, low, median carina, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long dark-brown terminal hairs; dorsal vestiture black, with a slight metallic reflection, venter yellowish white, colors separated on sides in a straight line; the scales somewhat raised along the mid-ventral line.

Wings rather narrow, hyaline; petiole of second marginal cell less than half as long as its cell, that of second posterior cell about equal to its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of wing beyond cross-veins broadly cuneiform, with subtruncate apices, dense, black, with a blue reflection on costa. Halteres pale with black knobs.

Legs rather long and slender, black with a bronzy reflection, femora whitish beneath; tibiæ and tarsi of front and middle legs bright brassy beneath; mid tarsi with outer two-thirds of second and all of the succeeding joints silvery white on outer side; hind tarsi bright bronzy beneath, the last two joints silvery beneath, except at their tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Digitized by Google

Male.—Palpi short, slender, about one-sixth as long as proboscis. Antennæ similar to those of the female, but the hairs rather longer and more abundant, a small secondary subapical whorl on each segment. Coloration as in the female. Wing venation and vestiture similar. Abdomen subcylindrical, somewhat expanded towards tip, with groups of coarse bristles apically. Legs with the tibiæ and tarsi pale bronzy beneath; mid tarsi with apical two-thirds of second and all the succeeding joints silvery white on outer side; hind tarsi with last two joints white beneath, except at their apices. Mid tarsi with a long and a short claw, those of hind tarsi small and subequal; formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Genitalia (plate 2, fig. 7): Side-pieces over twice as long as wide, the tips conically tapered; three hairs in a row at middle of side-piece; clasp-filament with a rather stout grooved stem, tip greatly expanded and distorted, middle lobe broad, with a row of fine setæ along its margin, apex of shaft bearing a stout tooth, inner lobe small, the outer one inflated in bladder form, veined from its base, with a capitate tip. Harpes rounded quadrate, tips bent downward and produced into large sharp spine, at the angle a semi-articulated crest, thick, with elliptical tip, and fringed on one side with long coarse lamellæ. Harpagones small, slender, with the unci forming a rounded triangular basal plate. Basal appendages represented by a row of six or seven spines on each side. Penultimate segment roundedly angled at sides, the angles prominent and densely setose; posterior margin of the venter also coarsely setose on each side.

Larva, Stage IV (plate 92, fig. 295).—Head rounded, roundedly truncate in front, with a large notch for the insertion of the antennæ, no lateral angles; antennæ small, stout, smooth; lower dorsal head-hairs and ante-antennal hairs single. Lateral abdominal hairs in twos or threes on first two segments, single on the following ones. Air-tube long, gradually and slightly tapered, about seven times as long as wide, the terminal hooks rather long; two single hairs on dorsal aspect near the middle, one on ventral aspect towards the base, and another towards the apex; a black ring at base of tube. Lateral comb of eighth segment of five large pointed teeth situated upon a large plate, which is angled in the middle behind and bears a hair at upper and lower margins. Anal segment longer than wide, with a large dorsal plate, spined on posterior margin and thickened and black on anterior and subventral margins; dorsal tuft of two long hairs on each side; lateral hairs single, long, arising from middle of side of plate; subventral tufts of three rather long hairs. Anal gills four, nearly equal, the upper pair a little shortened, the lower ones scarcely longer than the anal segment, the tips rounded.

The larvæ live in water in bamboo-joints and similar locations. Mr. Busck bred the species from a larva in bamboo, associated with *Sabethinus undosus*. Mr. Jennings obtained the larvæ in bamboo-traps.

Panama.

Tabernilla, Canal Zone, May 10, 1906, larvæ in bamboo-joints (A. Busck); May 23, 1908 (A. H. Jennings).

This species, when first submitted to study, was supposed to be *Wyeomyia chalcocephala*, but further study revealed differences. Its description under two separate names was due to an error of observation of the specimen which served as the type of *symmachus*. The prothoracic lobes are in fact not tipped with white as described, the error having been caused by the shining appearance of the scales.

Digitized by Google

WYEOMYIA CHALCOCEPHALA Dyar & Knab.

Wyeomyia chalcocephala Dyar & Knab, Proc. Biol. Soc. Wash., xix, 140, 1906.
Wyeomyia chalcocephala Theobald, Mon. Culic., v. 624, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA CHALCOCEPHALA:

Prothoracic lobes entirely dark; head bronzy behind, the eyes with a white margin that is narrowed centrally.

7 specimens, Trece Aguas, Alta Vera Paz, Guatemala (Schwarz and Barber), and others, presumably the same, but badly denuded of scales, from Aguna, Guatemala (D. G. Eisen) and Bocas del Toro, Panama (P. Osterhout).

***Type.*—Cat. No. 10,002, U. S. Nat. Mus.**

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA CHALCOCEPHALA:

Female.—Proboscis rather short, swollen apically, vestiture black, with a bronzy and blue reflection, a paler luster beneath; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-fifth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, with whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, blackish brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection, a small ill-defined metallic spot at the vertex, a white patch below; a faint white border along the eyes below, not reaching the vertex; two long setæ at vertex and short ones along margin of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, black with a submetallic reflection; a silvery patch at base. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales on anterior margin whitish, those below lateral angles silvery; bristles over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, a faint median carina, dark brown, a group of small setæ near the posterior margin. Pleuræ and coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, colors separated at sides in a straight line.

Wings rather narrow, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins dense, elongate-ovate, black, with a blue reflection on the costa. Halteres whitish with black knobs.

Legs rather long and slender, black with a bronzy and blue reflection, the femora whitish beneath; tibiæ and tarsi with a bright bronzy luster beneath; mid tarsi with apical third of second and all of third, fourth, and fifth joints white outwardly; hind legs with last two tarsal joints whitish beneath, except at their tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.5 mm.

Male.—Palpi short, slender, about one-fifth as long as proboscis. Antennæ similar to those of the female, a small secondary subapical whorl on each segment, the basal whorls longer and denser than in the female. Coloration similar to female. Wing narrower than in the female, venation and vestiture similar. Abdomen subcylindrical, slightly enlarged towards tip, with groups of coarse bristles apically. Legs with tibiæ of front pair pale brassy beneath, their apices and tarsi bronzy beneath; mid legs brilliant brassy beneath, becoming almost silvery on last four tarsal joints and spreading onto outer side; hind legs with femora and tibiæ pale brassy beneath, tarsi silvery beneath along their entire

Digitized by Google

length, on last joint the silver expanded to outer side. Mid tarsi with the claws slightly unequal and semi-opposed, those of hind tarsi small and subequal; formula, 0.0–0.0–0.0.

Genitalia (plate 5, fig. 27): Side-pieces over twice as long as wide, the tips conically tapered; six setæ in a nearly straight row towards base. Clasp-filament with a very long, slender stem, the tip divided into three separate lobes; inner lobe slender, with a spine near its tip; middle lobe small, elliptical, with a row of coarse, blunt teeth; outer lobe broad, rounded, with a projection below, rows of setæ and long coarse hairs at apex. Harpes slender, the tips curved and obscurely dentate. Harpagones and unci with their tips contiguous, forming basal cylinders. Basal appendages represented by two or three stout hairs on each side.

Larva, Stage IV (plate 92, fig. 296).—Head rounded, the posterior angles prominent; antennæ rather long, slender, with a minute single hair at outer fourth; head-hairs small, in threes, only the hairs above the mouth single. Lateral comb of eighth segment of many spines in a large patch, three or more rows deep; a long two-haired tuft behind. Air-tube rather stout, very slightly fusiform, less than four times as long as wide; dorsal aspect with a number of single hairs unevenly distributed; ventral aspect with a tuft near base, followed by a long two-haired tuft; a false pecten of five stout spines beginning near the middle and running to the apical fourth, followed by slight hairs. Anal segment about as long as wide, with a large dorsal plate; dorsal tuft of five hairs on each side; lateral hair long, single; subventral tuft probably small, stellate. Anal gills missing in the specimen.

The larvæ live in the water in the flower-bracts of a species of *Heliconia* with upright flowers. Mr. Barber found them associated with *Wyeomyia galoa*.

Guatemala.

Cacao, Trece Aguas, Alta Vera Paz, April 1, 15, and 17, 1906 (H. S. Barber).

We have removed the specimens from Aguna, Guatemala, and Bocas del Toro, Panama, referred to in the original description, from this species, as their condition is such that they can not be determined with accuracy. The specimens which we determined for Mr. Busck as *Wyeomyia chalcocephala* will be found here referred to under *Wyeomyia symmachus*. We are puzzled as to the exact identity of this species and fear some confusion still exists in the material. According to the collector, the specimens were bred from *Heliconia* and the larvæ are in fact of the type that occurs in that plant; but the male genitalia are those of a bromelia-inhabiting species. We base our description upon the adults, and refer to the larvæ and life history upon the authority of the collector, but with doubt and reservation.

WYEOMYIA SIMMSI (Dyar & Knab).

Phoniomyia simmsi Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 65, 1908.
Phoniomyia (?) *simmsi* Theobald, Mon. Culic., v, 623, 1910.

ORIGINAL DESCRIPTION OF PHONIOMYIA SIMMSI:

Female.—Proboscis long and slender, black-scaled; palpi short, slender, black-scaled; occiput dark-scaled, with bronzy and blue reflections; eyes margined with whitish scales, which are more conspicuous on the vertex; wedge between the eyes white-scaled; prothoracic lobes dark-scaled, with blue reflection; mesonotum dark-brown-scaled, with bluish reflection; metanotum with a group of setæ near the apex, without scales; postscutellum clothed with scales like those of the abdomen; abdomen dark-scaled above, with coppery and blue reflections; beneath silvery white-scaled, the lateral margins straight; tip of abdomen blunt, bristly; wing-veins clothed with brown, rather broad scales; legs dark-scaled, with blue and bronze reflections; under side of the femora and tibiæ whitish-scaled; on the hind legs the tarsi are light-scaled beneath, becoming clear silvery white upon the last tarsal joint. Length, 3.5 mm.

Digitized by Google

One specimen, Porto Bello, San Felipe, Panama, bred from a larva in water in the leaves of bromeliaceous plants. (A. H. Jennings.)

Type.—Cat. No. 11976, U. S. N. M.

Named, at the suggestion of Mr. A. H. Jennings, in honor of Mr. H. Simms, a most efficient sanitary inspector at Empire, in the Canal Zone, Panama.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA SIMMSI:

Female.—Proboscis long and slender, hardly swollen at tip, labellæ small, rounded, with fine outstanding setæ; vestiture bluish black, bronzy beneath. Palpi short, one-eighth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, with a silvery-white pruinosity; hairs of whorls long, rather sparse, black. Clypeus broad, truncate in front, convex, silvery pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with dull bronzy and blue reflection, a small white spot at the vertex and a large white spot at the lower part of sides, part of margin of eyes white; two setæ at the vertex.

Prothoracic lobes large, elliptical, not closely approximated dorsally, clothed with flat dark bronzy violaceous scales; a row of black bristles on front margin. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales below lateral angles whitish; setæ over roots of wings coarse, short, dark brown. Scutellum weakly trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, blackish, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with long, dark-brown terminal setæ; dorsal vestiture black, with a slight bronzy reflection; venter yellowish white, the colors separated at the sides in a straight line; scales suberect along the medioventral line.

Wings moderate, hyaline; petiole of second marginal cell one-half as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins spatulate, rather narrow, those on apical portion of second to fourth veins broader and denser, brown, with a slight bronzy reflection. Halteres whitish with black knobs.

Legs moderately slender, black, with a bronzy reflection, femora silvery whitish beneath; tarsi with bronzy luster below; hind tarsi with third joint with a white spot at base below, basal two-thirds of fourth and fifth joints white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Similar to the female. Antennæ with the joints hardly shorter than in the female, with small subapical whorls; hairs of basal whorls longer and more numerous. Abdomen expanded apically, with numerous coarse black bristles. Hind tarsi marked as in the female. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 5, fig. 28): Side-pieces over twice as long as wide, the tips conically tapered; three long setæ in a row towards base. Clasp-filament with a long, slender stem, the tip expanded and trilobed; middle lobe very large, broad, membranous, the tip truncate and shallowly emarginate, clothed with rows of setæ; lateral lobes both small, mere appendages upon the middle lobe, each with a sharp point at apex. Basal lobes of side-pieces rounded triangular, setose. Harpes, harpagones, and unci with incurved tips, forming a series of three basal cones. Basal appendages represented by two stout setæ on each side.

Larva, Stage IV (plate 92, fig. 297).—Head rounded, lateral angles moderate,

Digitized by Google

occipital foramen wide; antennæ rather long, slender, with a double hair at outer fourth; upper dorsal head-hairs multiple, the ones above the mouth single, ante-antennal tuft multiple. Lateral comb of eighth segment of about twenty spines in a long single row reaching well towards the ventral line, followed by a four-haired tuft. Air-tube long, slightly fusiform towards base, gradually and slightly tapering outwardly, about seven times as long as wide, clothed with numerous evenly spaced two-haired short tufts in three series; apical hooks moderate. Anal segment as long as wide, with a large dorsal plate; dorsal tuft of two long hairs on each side; lateral hair single, long, attached to the angle of the plate; subventral tufts moderate, five-haired. Anal gills somewhat longer than the segment, broad, rounded at tip, subequal.

The larvæ live in the water between the leaves of epiphytic Bromeliaceæ.

Panama.

Fort San Felipe, Porto Bello, January 4, 1908, larvæ in a bromeliad (A. H. Jennings).

WYEOMYIA LEUCOPISTHEPUS Dyar & Knab.

Wyeomyia leucopisthepus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 212, 1907.
Wyeomyia leucopisthepus Busck, Smiths. Misc. Colls., quart. iss., iii, 73, 1908.
Wyeomyia leucopisthepus Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA LEUCOPISTHEPUS:

Proboscis rather long and slender, swollen at the apex; palpi very short, black scaled; occiput dark scaled, with blue-green luster, the eyes evenly white margined, a small white spot on the vertex; prothoracic lobes large and prominent, well separated, clothed with dark scales, the apices and bases silvery scaled; mesonotum brown scaled, in front with a few whitish scales; metanotum blackish with a group of setæ towards the apex; abdomen black scaled above, white scaled beneath, the colors separated in a straight line on the sides; legs dark with bronzy luster, brassy beneath, on the hind legs the fourth and fifth tarsal joints are silvery-white scaled on the inner side except at their apices which are dark scaled; scales of the wing-veins long and narrow. Length, 2.5 mm.

One specimen, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in water in the leaves of Bromelias.

Type.—No. 10861, U. S. National Museum.

DESCRIPTION OF MALE OF WYEOMYIA LEUCOPISTHEPUS (FEMALE AND LARVA UNKNOWN):

Male.—Proboscis long, slightly expanded apically, labellæ small, rounded, with fine outstanding setæ; vestiture bluish black above, beneath bronzy, silvery at base. Palpi short, flattened, one-eighth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; the joints with small secondary subapical whorls; tori subspherical, with a cup-shaped apical excavation, luteous brown, with a slight pruinosity; hairs of whorls long, abundant, black. Clypeus rounded, convex, brown pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a metallic reflection; a small silvery spot at the vertex; a narrow border along the eyes, not attaining the vertex, widening into a patch below; two long setæ at the vertex and smaller ones along margins of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat scales, brown above, white at base; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat brown scales with a submetallic bluish and bronzy reflection; scales below lateral angles grayish silvery, setæ over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, with a broad, low median carina, blackish brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, expanded apically and with a series of coarse, dark-brown terminal setæ; dorsal vestiture black with a slight metallic

Digitized by Google

reflection; venter silvery white, the colors separated at the sides in a straight line, the scales raised along the mid-ventral line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant nearly its own length from anterior cross-vein; outstanding scales of veins ligulate, narrowly ovate on forks of second and fourth veins and outer half of third, black, with bronzy reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black with a bronzy and blue reflection, femora whitish beneath; tibiæ and tarsi bronzy beneath, brassy on the mid legs; hind legs with first tarsal joint white beneath on basal half, second and third white at base, fourth and fifth white beneath except at tips. Mid tarsi with two unequal claws, one strongly curved, those of hind tarsi small and subequal; formula, 0.0–0.0–0.0.

Length: Body about 2.8 mm.; wing 2.3 mm.

Genitalia (plate 5, fig. 29): Side-pieces over twice as long as wide, the tips strongly tapered; inner margin rather broadly thickened; three long setæ towards the base in line; basal lobes rounded triangular, setose. Clasp-filament with a bent, slender stem, tip expanded into three lobes; middle lobe large, broadly quadrate, with a row of setæ along the margin and across the disk; inner lobe short, truncate, like a lateral fold of middle lobe; outer lobe small, with a large erect terminal spine. Harpes elliptical, narrow, the inner margin thickened, bent at the tip and obscurely dentate. Harpagones and unci forming basal cylinders. Basal appendages represented by two stout setæ on each side.

Mr. Busck obtained the larvæ of this species, but preserved no skins.

The larvæ live in water between the leaves of epiphytic Bromeliaceæ. Mr. Busck bred our single specimen from a *Tillandsia* in which were associated *Wyeomyia circumcincta, Wyeomyia philophone,* and *Culex jenningsi.*

Panama.

Tabernilla, Canal Zone, July 10, 1907 (A. Busck).

WYEOMYIA PHROSO, new species.

DESCRIPTION OF FEMALE OF WYEOMYIA PHROSO (MALE AND LARVA UNKNOWN):

Female.—Proboscis short and stout, somewhat enlarged towards tip, labellæ small, rounded, with fine outstanding setæ; vestiture bluish black, with a line of brassy scales beneath. Palpi short, one-fifth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish; hairs of whorls long, rather sparse, black. Clypeus broad, truncate in front, convex, blackish. Eyes separated at vertex by a narrow wedge, bluish black. Occiput clothed with flat brown scales with a dull bronzy and blue reflection, with an indistinct paler margin along the eyes, a white spot at lower part of side; two setæ at the vertex and a row of smaller ones along margin of eyes.

Prothoracic lobes large, elliptical, not closely approximated dorsally, clothed with flat dark-brown scales with violaceous and coppery luster; a row of black bristles on front margin. Mesonotum clothed with elliptical, flat dark-brown scales with a bronzy and blue reflection; scales below lateral angles pale; setæ over roots of wings coarse, blackish. Scutellum weakly trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small coarse setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat white scales.

Abdomen subcylindrical, compressed, truncate apically, and with long dark-brown terminal setæ; dorsal vestiture black, with a slight bronzy reflection; venter yellowish white, colors separated at the sides in a straight line.

Digitized by Google

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins broad, subovate, tips weakly subtruncate, broader and denser on forks of second to fourth veins, brown, with a slight bronzy reflection. Halteres whitish with dark knobs.

Legs moderately slender, black with a bronzy reflection, femora brassy narrowly beneath; tarsi with slight bronzy luster below; mid tarsi with apex of second, all of third and all but base of fourth joints silvery white on outer side, the white continuous beneath from second to fourth joints; hind tarsi with last two joints white beneath. Claw formula, 0.0–0.0–0.0.

Length: Body 4 mm.; wing 3.5 mm.

Type: No. 12704, U. S. Nat. Mus.

Life history and habits unknown.

Panama.

Gatun, Canal Zone (A. H. Jennings).

Mr. Jennings captured a single specimen of this species.

WYEOMYIA CIRCUMCINCTA Dyar & Knab.

Wyeomyia circumcincta Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 210, 1907.
Wyeomyia macrotus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 212, 1907.
Wyeomyia macrotus Busck, Smiths. Misc. Colls., quart. iss., lii, 73, 1908.
Wyeomyia circumcincta Busck, Smiths. Misc. Colls., quart. iss., lii, 74, 1908.
Wyeomyia andropus Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 68, 1908.
Wyeomyia circumcincta Theobald, Mon. Culic., v, 581, 1910.
Wyeomyia macrotus Theobald, Mon. Culic., v, 581, 1910.
Wyeomyia andropus Theobald, Mon. Culic., v, 626, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA CIRCUMCINCTA:

♂.—Proboscis moderate, much dilated at the tip, black; palpi very short, dark scaled; occiput dark scaled with bluish iridescence, eyes narrowly margined with white; prothoracic lobes prominent, well separated, clothed with dark scales which have at the tip a violaceous coppery metallic sheen; mesonotum dark scaled, with bronzy and obscure bluish reflections, the front margin distinctly whitish scaled; scutellum clothed like the mesothorax; metanotum pitchy black, with a group of setæ near the apex; abdomen black above with blue and bronzy luster, creamy white beneath, the colors separated in a straight line on the sides; legs dark above with bronzy luster, beneath mostly with a light brassy whitish sheen, on the middle legs and apical half of the second and all of the succeeding joints completely encircled with silvery white; brassy color of the under surface is interrupted beneath by a dark shade on the first and second tarsal joints, the fore femora are mostly bronzy beneath on the apical half. Length, 3 mm.

Two specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in the water in leaves of Bromelias.

Type.—No. 10857, U. S. National Museum.

ORIGINAL DESCRIPTION OF WYEOMYIA MACROTUS:

Proboscis rather long and slender, swollen at the apex, black scaled; palpi short, black scaled; clypeus prominent, black, with fine grayish pubescence; occiput dark scaled with bluish luster, a metallic spot on the vertex, no white margin to the eyes; prothoracic lobes large and prominent, well separated, blackish scaled, the tips and basal part white in certain lights and connected behind by a whitish band; mesonotum brown scaled, with faint bronzy and blue reflections, the hairs of the scutellum dark; metanotum dark brown with a few setæ near the apex; abdomen dark scaled above with bronzy and bluish luster, beneath creamy white, the colors separated in a straight line on the sides; legs moderately slender, dark with bronzy luster, brassy beneath; scales of the wing-veins mostly short and broad, a few longer ones in the region of the cross-veins. Length, 3 mm.

Three specimens, Boqueron River, Panama, and Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in the water in the leaves of Bromelias. The pupa has remarkably long breathing tubes.

Type.—No. 10862, U. S. National Museum.

Digitized by Google

ORIGINAL DESCRIPTION OF WYEOMYIA ANDROPUS:

Female.—Proboscis rather short and stout, swollen toward the apex, black-scaled; palpi black-scaled; occiput dark-scaled, with greenish and brownish reflections, the eyes not distinctly white-margined above, the marginal scales being of a grayish cast; prothoracic lobes dark-scaled, with greenish and bronzy luster and without pale scales on the apices; mesonotum dull brown-scaled, with obscure bronzy and bluish luster; abdomen dark-scaled above, nearly black, beneath yellowish white-scaled, the colors separated on the sides in a straight line; legs dark-scaled, with bronzy and bluish reflections, without white markings on the tarsi. Length, 3 mm.

Male.—The proboscis somewhat longer and more slender than in the female, abdomen expanded toward the tip, the claspers widely separated and conspicuous; fore tibiæ and tarsi silvery yellowish-scaled beneath, the color whitest and most conspicuous on the second, third, and fourth joints; mid-legs, with the tibia, the basal half of the first tarsal joint silvery white marked beneath, the apical half of the second joint and all of the succeeding joints silvery white marked above and beneath; hind legs entirely dark.

Twenty-six specimens, Porto Bello, Fort San Felipe, and Caldera Island, Porto Bello Bay, Panama, bred from larvæ in water between the leaves of bromeliaceous plants. (A. H. Jennings.)

Type.—Cat. No. 11989, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, LARVA, AND PUPA OF WYEOMYIA CIRCUMCINCTA:

Female.—Proboscis moderate, swollen apically, vestiture black with a bronzy and blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish, with a slight pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded, convex, blackish pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat dark-brown scales with a metallic reflection, a white patch below; two long hairs at the vertex and smaller ones along margin of eyes.

Prothoracic lobes large, elliptical, well separated, clothed with flat scales, dark brown like mesonotum, with a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with a submetallic reflection; scales on anterior margin and lateral angles whitish; bristles over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of dark-brown bristles. Postnotum elliptical, prominent, with an obscure median carina, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many long, dark-brown terminal setæ; dorsal vestiture black with a slight bronzy and blue reflection; venter yellowish white, colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins ovate, blunt at tip, black, with a blue and bronzy reflection on the costa, broader and denser on tip of wing. Halteres whitish with black knobs.

Legs rather long and slender, black, with bronzy and blue reflection, femora whitish beneath; tibiæ and tarsi with pale-brassy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.8 mm.; wing 2.7 mm.

Male.—Proboscis more slender than in the female, with a bronzy luster beneath. Palpi very small. Antennæ similar to those of the female, hairs of whorls longer and more abundant, a small secondary subapical whorl on each joint. Coloration of head and body as in the female. Abdomen rather slender, expanded towards tip, claspers long and prominent, widely separated. Wing hardly narrower than in the female, venation and vestiture much the same. Front legs with a strong brassy luster beneath, becoming almost silvery and

Digitized by Google

broader on last four tarsal joints; mid legs with femora and tibiæ and basal half of first tarsal joint yellowish silvery beneath, outer half of first tarsal joint and basal third of second ringed with blackish brown, apical two-thirds of second and all of the succeeding joints silvery white all around. Claws on mid tarsi large, unequal, the longer one more strongly curved, those of hind tarsi small, subequal; formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 6, fig. 37): Side-pieces more than three times as long as wide, basal third quadrate, its outer angle produced into a long curved projection covered with hairs and twice as long as basal part, from inner base of which the rudiment of the clasp-filament arises; a row of long, very broad hairs within near tip of trunk of side-piece. Clasp-filament small, attenuated in the middle, the tip angularly expanded. Harpes, harpagones, and unci with their tips approximated, forming a series of basal cones. Basal appendages represented by three stout setæ on each side.

Larva, Stage IV (plate 92, fig. 298).—Head rounded, the front somewhat pointed, forming an angle behind the insertion of antennæ, and another posteriorly at edge of occipital foramen; antennæ rather long, as long as half the length of head, slightly curved, and bearing a small tuft beyond the middle; head-hairs ample, approximated tufts; ante-antennal tuft distant from antennal base, multiple, the other tufts long, multiple, conspicuous, rendering the head unusually hairy. Lateral abdominal hairs in twos after the second segment. Comb of eighth segment of many spines in a large patch, about three rows deep, followed by a five-haired tuft. Air-tube long, tapering strongly on basal third, outer portion attenuated and slightly curved forward, becoming uniform in width toward tip; a row of single hairs on dorsal aspect; a similar row on ventral aspect, replaced toward base by a three-haired tuft; a false pecten of six long teeth, single, situated on ventral line before middle of tube; tube about eight times as long as basal width. Anal segment longer than wide, with a large dorsal plate; dorsal tuft of four hairs on each side; lateral tuft long, double; subventral tuft short, stellate. Anal gills long, about twice as long as the segment, somewhat pointed at tips.

Pupa (plate 148, fig. 699).—Cephalothoracic mass large, pyriform; two pairs of long single hairs anteriorly, just above eyes; air-tubes very long and very slender, about as long as cephalothorax, hardly expanded at tip. Abdomen depressed, moderately long; stellate tufts of first segment well developed; second to sixth segments with series of very long dorsal hairs; seventh and eighth segments with moderate fan-shaped tufts. Anal paddles small.

The larvæ live in water between the leaves of epiphytic Bromeliaceæ. Mr. Busck found them associated with *Wyeomyia philophone, Wyeomyia leucopistheopus, Culex jenningsi,* and *Megarhinus superbus;* Mr. Jennings also obtained them several times, once associated with *Wyeomyia simmsi* and once with *Orthopodomyia phyllozoa.*

Panama.

Boqueron River, May 23, 1907, larvæ in bromelias (A. Busck); Tabernilla, Canal Zone, July 10, 1907, an adult issued August 20, larvæ in true bromelia-water (A. Busck); Fort San Felipe, Porto Bello, January 4, 1908, and January 21, 1908, larvæ in bromelia-water (A. H. Jennings); Caldera Island, Porto Bello Bay, January 20, 1908, larvæ from a bromelia (*Tillandsia*) taken at the edge of the mangrove swamp on the mainland side of the island (A. H. Jennings); Porto Bello, February 16, 1909, larvæ from *Tillandsia* (A. H. Jennings); Cascajal River, February 18, 1909, larvæ from bromelias overhanging a branch of the stream (A. H. Jennings); Upper Pequini River, March 25, 1909, from bromelias on a tree at Survey Camp No. 3 (A. H. Jennings); Alhajuela,

Digitized by Google

Chagres River, Canal Zone, March 18, 1909, "from tree-hole in bush back of station on trail to Vigia" (A. H. Jennings).

This species is peculiar from its marked sexual dimorphism and the very long air-tubes of the pupa. The differences between the sexes led to their being described as distinct species, our types of *circumcincta* being all males, the *macrotus* all females. Subsequently an excellent series of both sexes was received from Mr. Jennings and was determined as a new species and described under the name *andropus*, as certain errors in the association of subsequent specimens and in the preliminary tables before us led us to this course. We had placed with *macrotus* some males with dark tarsi which resembled it, while the *circumcincta* had been classified under the heading "eyes with a white margin." In strongly marked males there is a faint trace of this marking, but we consider it too slight to be described as present. Our final study led to the correction of these errors and the recognition of the above synonymy.

WYEOMYIA CŒNONUS, new species.

DESCRIPTION OF FEMALE AND MALE OF WYEOMYIA CŒNONUS (LARVA UNKNOWN):

Female.—Proboscis rather short, swollen apically, vestiture black with a bronzy and blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-sixth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish, with a slight pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded, convex, blackish pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat dark-brown scales with a slight metallic reflection, a white patch at sides below; two long hairs at the vertex and smaller ones along margin of eyes.

Prothoracic lobes large, elliptical, well separated, clothed with flat scales, dark brown like mesonotum, with dark-blue reflection, a row of setæ on anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with submetallic reflection, scales on lateral angles whitish; bristles over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of dark-brown bristles. Postnotum elliptical, prominent, brown, a group of setæ near posterior margin. Pleuræ and coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically and with many brown terminal setæ; dorsal vestiture black, with a slight bronzy and blue reflection; venter silvery white, the colors separated on the sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales of veins broadly ovate, obliquely subtruncate at tips, black, with a blue and bronzy reflection on costa. Halteres pale with blackish knobs.

Legs rather long and slender, black with bronzy and blue reflection, the femora whitish beneath at base; tibiæ and tarsi with a paler luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3.5 mm.

Male.—Proboscis as in the female. Palpi very small. Antennæ similar to those of the female, the hairs of the whorls longer and more abundant, a small secondary subapical whorl on each joint. Coloration of head and body as in the female. Abdomen rather slender, considerably expanded toward tip, the claspers long and prominent, widely separated. Wing slightly narrower than in the female, vestiture somewhat sparser. Mid legs yellowish silvery beneath, broadened on last four tarsal joints. Claws on mid tarsi large, unequal, the

Digitized by Google

longer one more strongly curved, those of hind tarsi small, subequal; formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Type: No. 12705, U. S. Nat. Mus.

Genitalia (plate 6, fig. 38): Side-piece short, conical, its outer angle produced into an arm twice as long as basal part; a dense tuft of long coarse hairs arising from inner aspect of basal part. Clasp-filament slender, attenuated, rather long, with tip triangularly expanded. Harpagones and harpes greatly reduced, minute, scarcely distinguishable. Basal appendages represented by three small spines on each side. Penultimate segment weakly angled on sides but not produced, the median ventral area densely hairy.

One of the bred adults bears an isolation number, but we have been unable to find the corresponding larval skin in Mr. Jennings's material.

The larvæ live in the water in the flower-bracts of *Calathea discolor*. Mr. Jennings bred our three types from this plant.

Panama.

Tabernilla, Canal Zone, April 14, 1909 (A. H. Jennings); Upper Pequini River, March 27, 1909 (A. H. Jennings).

The species is closely allied to *Wyeomyia circumcincta*, but occurs in another plant (*Calathea*) and is clearly distinct. According to Mr. Jennings's notes, the specimens from the Pequini River were obtained from bromelias, and if this note is correct the species must inhabit both plants. We suspect, however, that some confusion has occurred in the labeling. *W. circumcincta* is a common species in bromelias, but *W. cænonus* was not met with until Mr. Jennings obtained collections from the *Calathea* plants, so we think that it is in all probability confined to this plant.

WYEOMYIA BARIA Dyar & Knab.

Wyeomyia baria Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 69, 1908.
Wyeomyia bana Theobald, Mon. Culic., v, 626, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA BARIA:

Female.—Proboscis moderately long and slender, much swollen apically, dark-scaled; palpi dark-scaled; occiput dark-scaled, with obscure bronzy luster; at the sides of the eyes very narrowly white-margined; on the vertex a minute white spot; prothoracic lobes dark-scaled, the apices silvery scaled, the basal portion also silver-scaled; mesonotum dark brownish-scaled, with bronzy and bluish luster; abdomen dark-scaled above, with brownish and bluish luster, beneath white-scaled, the colors separated on the sides in a straight line; legs dark-scaled, with bronzy and blue reflections; front and mid tarsi unmarked; hind tarsi with the fourth joint silvery white scaled to the apex beneath; the fifth joint silvery white-marked beneath on its basal two-thirds. Length, 3 mm.

One specimen, Sonsonate, Salvador, August 30, 1905. (F. Knab.)

Type.—Cat. No. 11992, U. S. N. M.

DESCRIPTION OF FEMALE OF WYEOMYIA BARIA (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, the tip expanded, the labellæ small, rounded, with fine outstanding setæ; vestiture bronzy black, with brighter luster beneath. Palpi short, flattened, one-fifth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, with a whitish pruinosity; hairs of the whorls long, rather sparse, black. Clypeus rounded, convex, dark-brown pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat dark-brown scales with a blue reflection, a large white spot at lower part of sides; two setæ at the vertex and smaller ones along margin of eyes.

Prothoracic lobes elliptical, well separated, clothed with flat dark-brown scales similar to those of mesonotum, lower half silvery white; a row of setæ

Digitized by Google

along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue reflection; scales below lateral angles whitish; bristles over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, a low, broad median carina, dark brown, a group of small setæ near posterior margin. Pleuræ brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, colors separated at sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant nearly its own length from anterior cross-vein; scales of veins rather long, ligulate, becoming dense, short, and cuneiform on second to fourth veins, broadest towards tip of wing, black, with a slight bronzy reflection on costa. Halteres whitish with black knobs.

Legs rather long and slender, black with a bronzy reflection, the femora whitish beneath; tibiæ and tarsi of front and mid legs bright brassy beneath; hind tarsi with fourth and fifth joints white beneath, except at their tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Life history and habits unknown.

Salvador.

Sonsonate, August 30, 1905, a single adult captured in the daytime (F. Knab).

WYEOMYIA CELÆNOCEPHALA Dyar & Knab.

Wyeomyia celænocephala Dyar & Knab, Proc. Biol. Soc. Wash., xix, 140, 1906.
Wyeomyia celaenocephala Theobald, Mon. Culic., v, 625, 1910.

ORIGINAL DESCRIPTION OF WYEOMYIA CELÆNOCEPHALA:

Prothoracic lobes all dark brown or blue; eyes without a white border; no vertical white patch; hind feet all dark, without white spots.

One specimen, Trece Aguas, Alta Vera Paz, Guatemala (Schwarz & Barber).

Type.—Cat. No. 10,006, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF WYEOMYIA CELÆNOCEPHALA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long and slender, slightly swollen apically, vestiture black with a bronzy and blue reflection; labellæ small, rounded, with fine outstanding setæ. Palpi short, flattened, one-seventh as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous brown, with whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, luteous brown, pruinose. Eye separated at the vertex by a narrow wedge, bluish black. Occiput badly denuded, clothed with flat brown scales with a metallic reflection, a white patch below continued narrowly upward along margin of eyes, apparently not reaching vertex; two setæ at the vertex and smaller ones along margins of eyes.

Prothoracic lobes elliptical, distinctly separated, badly denuded, apparently clothed with flat scales, dark with violaceous reflection, silvery below; a row of setæ along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales, with a bronzy and blue reflection; scales below lateral angles silvery grey; setæ over roots of wings dark brown. Scutellum trilobate, with vestiture similar to and continuous with that of mesonotum, each lobe with a small tuft of black bristles. Postnotum elliptical, prominent, dark brown, a group of small setæ near posterior margin. Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Digitized by Google

Abdomen subcylindrical, compressed, truncate apically, and with many long dark-brown terminal setæ; dorsal vestiture black, with a slight metallic reflection; venter yellowish white, the colors separated at the sides in a straight line; scales raised along the mid-ventral line.

Wings moderate, hyaline; petiole of the second marginal cell rather more than one-third as long as its cell, that of the second posterior cell shorter than its cell; basal cross-vein distant much less than its own length from the anterior cross-vein; outstanding scales of the veins ligulate, black, with blue reflection on the costa, denser and broader on second to fourth veins outwardly, narrowly ovate at tip. Halteres whitish with black knobs.

Legs rather long and slender, black with bronzy and blue reflection, a strong bronzy luster below, femora whitish beneath; mid tarsi with apical third of second and all of third to fifth joints silvery white on outer side. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Life history and habits unknown.

Guatemala.

Cacao, Trece Aguas, Alta Vera Paz, April 15, 1906 (Schwarz and Barber), a single captured adult.

WYEOMYIA HAPLA Dyar & Knab.

Wyeomyia hapla Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 265, 1909.

ORIGINAL DESCRIPTION OF WYEOMYIA HAPLA:

FEMALE.—Proboscis very long and slender, the tip slightly enlarged; black. Palpi short, black-scaled. Occiput dark-scaled, with iridescent reflections in some lights. Prothoracic lobes large, prominent, clothed with dark blue scarcely metallic scales and with numerous coarse black bristles along the margin. Mesonotum dark-scaled with slightly metallic luster, predominatingly of a dull green color; scutellum clothed with similar scales. Abdomen black-scaled above, with faint greenish and bluish luster, white-scaled beneath, the colors separated on the sides in a straight line. Legs black-scaled with greenish luster, the mid tarsi white-scaled on the fourth joint below, the hind tarsi at base of second and third, the fourth and fifth joints white below except at the tips.

One specimen, Caldera Island, Porto Bello Bay, Panama, bred from a larva in water between the leaves of a bromeliaceous plant (A. H. Jennings).

Type no. 12102, U. S. N. M.

Described from one of the types of *W. dymodora* D. and K., which was wrongly included and does not fit the description. The Fort San Felipe specimen remains as the type.

DESCRIPTION OF FEMALE AND LARVA OF WYEOMYIA HAPLA (MALE UNKNOWN):

Female.—Proboscis long and slender, apical fourth enlarged, labellæ moderate, with fine outstanding setæ; vestiture bronzy black. Palpi short, one-eighth as long as proboscis, bronzy black. Antennæ moderate, the joints slender, subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish, with whitish pruinosity; hairs of whorls long, rather sparse, black. Clypeus rounded, convex, dark brown, pruinose. Eyes separated at the vertex by a narrow wedge, bluish black. Occiput clothed with flat dark scales with iridescent reflection in some lights, a silvery patch on lower part of sides; two setæ on the vertex and smaller ones along the eye margin.

Prothoracic lobes elliptical, well separated, clothed with blackish scales with slight submetallic luster and with a row of black bristles along anterior margin. Mesonotum clothed with elliptical, flat dark-brown scales with bronzy and blue luster; scales below lateral angles silvery gray; setæ over roots of wings dark brown. Scutellum trilobate, vestiture similar to that of mesonotum, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, with a low median carina, dark brown, a group of small setæ near the posterior margin.

Digitized by Google

Pleuræ dark brown, coxæ luteous, clothed with elliptical, flat silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, and with many dark-brown terminal setæ; dorsal vestiture black, with a faint greenish and bluish luster; venter silvery white, the colors separated in a straight line; the scales raised along the mid-ventral line.

Wings moderate, hyaline; petiole of second marginal cell a little more than one-third as long as its cell; that of second posterior cell a little longer than its cell; basal cross-vein incident with anterior cross-vein; outstanding scales of veins ligulate, black, with a blue reflection on costa, denser and broader on forks of second and fourth veins and on outer half of third, becoming ovate at tip of wing. Halteres whitish with black knobs.

Legs rather long and slender, vestiture black with a bronzy and blue luster, a stronger bronzy luster beneath; femora pale beneath; mid tarsi with basal two-thirds of fourth joint silvery white on outer side, third joint with a strong brassy luster without; hind tarsi with second and third joints with a small spot beneath at base, fourth and fifth joints silvery white beneath except at their apices. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 2.8 mm.

Larva, Stage IV (plate 93, fig. 299).—Head rounded, the latero-posterior angles moderate, the occipital foramen reaching them; upper head-tuft short, in fours, lower single; ante-antennal tuft in fours; antennæ moderate, rather long, with a double hair at outer third. Lateral abdominal hairs in fours on first segment, in twos on second to sixth, single on seventh; lateral comb of eighth segment of about twenty scales in a single straight row, followed by a long single hair. Air-tube slender, slightly fusiform, about six times as long as wide at base, covered uniformly, but sparsely, with moderate single hairs, terminal fourth nearly without hairs; terminal hooks moderate. Anal segment longer than wide, with a large dorsal plate; dorsal tuft of two long hairs on each side; lateral hair single, long; subventral tuft moderate, multiple. Anal gills over twice as long as the segment, stout with broadly rounded tips, lower pair slightly longer and stouter than upper pair.

The larvæ live in water between the leaves of epiphytic Bromeliaceæ. Mr. Jennings took them in a bromeliad on a fallen tree, associated with *Wyeomyia abrachys*.

Panama.

Caldera Island, Porto Bello Bay, January 4, 1908 (A. H. Jennings).

WYEOMYIA SCOTINOMUS (Dyar & Knab).

Phoniomyia scotinomus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 209, 1907.
Phoniomyia scotinomus Busck, Smiths. Misc. Colls., quart. iss., lii, 75, 1908.
Wyeomyia dymodora Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 63, 1908.
Phoniomyia scotinomus Theobald, Mon. Culic., v, 579, 1910.
Wyeomyia dymodora Theobald, Mon. Culic., v, 626, 1910.

ORIGINAL DESCRIPTION OF PHONIOMYIA SCOTINOMUS:

♂.—Proboscis long and slender, very slightly enlarged towards the apex, black; palpi very short; clypeus yellow-brown; occiput dark scaled, the vertex and dividing line of the eyes obscurely silvery; prothoracic lobes prominent, approximated, clothed with dark scales with a blue and violet luster; mesonotum clothed with dark-brown scales with slight bronzy luster, faintly greenish in certain lights; scales of the scutellum like those of the mesonotum; setæ of the scutellum dark; metanotum deep brown with a group of setæ towards the apex; abdomen black scaled above, with faint bluish luster, beneath lustrous whitish, the colors separated in a straight line on the sides, apex of the abdomen dilated; legs dark scaled above,

Digitized by Google

beneath brassy, the middle legs silvery beneath on the third and fourth joints, hind legs silvery beneath on the last joint. Length, 3 mm.

♀.—Similar to the male.

Three specimens, Boqueron River, Panama, and Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in water in the leaves of Bromelias.

Type.—No. 10855, U. S. National Museum.

ORIGINAL DESCRIPTION OF WYEOMYIA DYMODORA:

Female.—Proboscis very long and slender, as in *Phoniomyia*, but slightly swollen at the tip, black-scaled; palpi black-scaled; occiput dark-scaled, with blue and green iridescence, margin of the eyes not distinctly light-scaled, and without white spot on the vertex; prothoracic lobes dark-scaled, with obscure bluish luster, without light scales at the apices; mesonotum obscurely brown-scaled; abdomen dark-scaled above, with bluish reflection, white-scaled beneath, the colors separated on the sides in a straight line; wings with the scales on the veins elongate, rather narrow; legs dark-scaled, with bronzy and blue reflection, fore and mid tarsi without white beneath; hind tarsi with the fourth and fifth joints silvery white-marked beneath, the fourth joint black at the apex, the white on the fifth joint continuous. Length, 3.5 mm.

Two specimens, Caldera Island, Porto Bello Bay, and Fort San Felipe, Porto Bello, Panama, bred from larvæ in water between the leaves of bromeliaceous plants. (A. H. Jennings.)

Type.—Cat. No. 11991, U. S. N. M.

The species resembles *W. clasoleuca* Dyar and Knab in coloration, but the long proboscis, almost like that of a *Phoniomyia*, and the narrow wing scales will easily separate it.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF WYEOMYIA SCOTINOMUS:

Female.—Proboscis long and slender, slightly broadened apically; labellæ conically tapered, with fine outstanding setæ; vestiture black. Palpi small, one-sixth as long as proboscis, clothed with black scales and rather long fine setæ. Clypeus rounded triangular, dark brown, slightly pruinose. Antennæ moderate, the joints subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, dark brown, slightly pruinose; hairs of whorls sparse, moderate, black. Eyes black, separated by a narrow wedge. Occiput broad, clothed with flat appressed scales, black with dull blue, green, and bronzy reflection, a white patch at sides below; two setæ at the vertex.

Prothoracic lobes slightly separated dorsally, brown, clothed with black scales with a dull bronzy and blue reflection; a row of black bristles on front margin. Mesonotum black, clothed with elliptical, flat scales, black, with dull blue and bronzy reflection; setæ at roots of wings and on front margin, short, black. Scutellum trilobate, the vestiture similar to and continuous with that of mesonotum, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, blackish, a tuft of small setæ posteriorly. Pleuræ brown, coxæ luteous, clothed with elliptical, silvery-white scales.

Abdomen subcylindrical, compressed, blunt at tip, with coarse black terminal setæ; dorsal vestiture bronzy black, with a metallic blue and green reflection; venter yellowish silvery white, the colors separated on the sides in a nearly straight line, the scales raised along the medioventral line.

Wings moderate, hyaline; petiole of second marginal cell half as long as its cell, that of second posterior cell about as long as its cell; basal cross-vein distant less than its own length from anterior cross-vein; outstanding scales of veins broadly linear, dark brown, with a blue reflection on costa, those on forks of second vein and apices of third and fourth veins broader and much denser. Halteres largely blackish.

Legs rather slender, vestiture black with a blue and bronzy reflection, trochanters and femora silvery white beneath; tarsi and tibiæ with pale metallic luster beneath; mid tarsi without white (hind tarsi broken at third joint). Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Digitized by Google

Male.—Similar to the female. Proboscis more distinctly swollen. Antennæ slender, the joints hardly shorter than in the female, with secondary subapical hair-whorl; hairs of whorls longer and more numerous. Abdomen expanded at tip. Legs with a strong luster beneath; mid tarsi with a white reflection beneath, strongest on second and third joints; last joint of hind tarsi white on basal half beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 5, fig. 30): Side-pieces over twice as long as wide, tips conically tapered; three long setæ in a line near base; basal lobes rounded trinagular, setose. Clasp-filament with a long, slender stem, the tip expanded into a large clasp, membranous, with setæ on margin and in a row across disk; a supporting corrugated median ridge; outer lobe forming a spine-like support along margin of middle lobe; inner lobe truncate, forming a recurved angle of middle lobe. Harpes narrow, thickened on inner margin, the tips curved and pointed. Harpagones and unci forming basal cones. Basal appendages represented by two stout setæ on each side.

Larva, Stage IV (plate 93, fig. 301).—Head rounded, with rounded angles behind eyes; antennæ moderate, uniform, a small two-haired tuft beyond the middle; upper head hair-tufts in fours, lower in twos and long; ante-antennal tufts in fours. Lateral abdominal hairs in fours on first segment, double on second to sixth, single on seventh. Air-tube rather long, subfusiform, tapering most near tip, about five times as long as wide at base; terminal hooks moderate; with uniformly distributed long single hairs, only those nearest apex shorter and doubled. Lateral comb of eighth segment of about twenty-three teeth in an even, straight row, nowhere doubled, the teeth becoming smaller ventrally. Anal segment longer than wide, with a large dorsal plate rounded laterally and reaching well toward ventral line; dorsal tuft of two long hairs on each side; lateral tuft on posterior margin of plate, of two long hairs; subventral tufts small, multiple. Anal gills four, equal, about as long as the segment, their tips bluntly rounded.

The larvæ live in water between the leaves of epiphytic Bromeliaceæ. Mr. Busck and Mr. Jennings both found the larvæ in such situations.

Panama.

Boqueron River, larvæ in water between leaves of bromeliads, May 23, 1907 (A. Busck); Fort San Felipe, Porto Bello, January 21, 1908, larvæ in water between leaves of bromeliads, associated with *Orthopodomyia phyllozoa.*

We first described this species under *Phoniomyia* and again under *Wyeomyia,* before having decided to unite these generic names. This unfortunate circumstance is additional proof of the undesirability of retaining genera founded upon such unreliable characters as these were. Under *Wyeomyia scotinomus* we cited a specimen from Tabernilla; but this we have now transferred to *Wyeomyia philophone.* Under *Wyeomyia dymodora* we cited a specimen from Caldera Island, which we have since made the type of *Wyeomyia hapla,* as further study has revealed differences.

WYEOMYIA HEMISAGNOSTA Dyar & Knab.

Wyeomyia hemisagnosta Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 227, 230, 1906.

ORIGINAL DESCRIPTION OF WYEOMYIA HEMISAGNOSTA:

Allied to *W. aporonoma* D. & K., but entirely without the broad black margin of the anal plate; the subdorsal abdominal hairs are long in twos and threes, while they are short, stellate tufts in *aporonoma.* They were collected by the junior author at Sonsonate, Salvador, in cacao shells, associated with *Aëdes cyaneus* and *W. durhami* and at Port Limon, Costa Rica.

Digitized by Google

The following is an abstract of the table:

1. Anal processes equally developed..... 3
3. Lateral comb of the eighth segment of many teeth in a long line.. 4
4. Comb of teeth in a band, at least in part two rows deep..... 7
7. Tube without false pecten..... 9
9. Tube straight, tapered only near the tip..... 10
10. Tube and plate without black ring; subventral tuft long.... *hemisagnosta*

DESCRIPTION OF LARVA OF WYEOMYIA HEMISAGNOSTA (ADULT UNKNOWN):

Larva, Stage IV (plate 93, fig. 303).—Head rounded, widest through eyes, oblique on sides, a small notch at insertion of antennæ, front margin arcuate. Antennæ small and slender, with a minute hair at outer fourth; four irregular spines and a digit on a long pedestal. Head-hairs single and slight. Mental plate narrow, triangular, with a prominent central tooth and eleven on each side, basal ones more remote, last one small. Mandible quadrangular, with a group of spines near base; a filament before tip; an outer row of cilia from a collar; a row of slender processes on outer margin with deeply divided tips; dentition of four teeth on a process, the first the longest; two spines before, a long filament and a row of thick hairs with divided tips within; process below long, taking the place of the basal angle, shortly furcate, with a row of hairs along margin and a tuft at tip of each limb; a row of stout hairs within and another at base. Maxilla irregularly hemispherical; a row of short, stout spines on inner margin, the whole half densely hairy; a tuft of long hairs at tip, with a long articulated spine; a row of hairs running down toward base of palpus, with a filament near the middle. Palpus small and stout, with four minute digits. Thorax quadrate, wider than long; abdomen moderate, anterior segment shorter; lateral hairs in fours on first two segments, in twos on third to fifth, single on sixth and seventh. Air-tube slightly tapered, three times as long as wide, with two rows of sparse single hairs, the basal posterior one double. Lateral comb of eighth segment a long band of spines, single above, double and smaller medianly and below; single spine simple and thorn-shaped or widened at tip, with a fringe of spinules. Anal segment as long as wide, with a dorsal plate reaching well down the sides; dorsal tuft of long hairs on each side; two long lateral hairs; subventral stellate tufts longer than the segment. Anal gills stout, subequal, bluntly rounded.

The larvæ live in the water collected in cocoanut-shells and similar locations, probably also in bamboo-joints or hollow trees.

Central America.

Sonsonate, Salvador, August 30, 1905, larvæ in cocoanut-husks on a plantation just out of town (F. Knab).

The original culture from which these larvæ were obtained contained numerous other larvæ, *Wyeomyia aporonoma, Limatus cacophrades, Hæmagogus albomaculatus,* and *Megarhinus moctezuma,* and adults were not obtained of this species. We have not since obtained specimens that we could associate with them. In our original description we cite also the locality Port Limon, Costa Rica, which may be correct, as we have a note of comparing a larval skin from that place taken from cacao-shells, but have at present omitted the locality, as the original drawing was not made from that specimen.

Genus PROSOPOLEPIS Lutz.

Prosopolepis Lutz, Imprensa Medica, 312, 1905.
Prosopolepis Peryassú, Os Culicid. do Brazil, 38, 1908.
Prosopolepis Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 65, 1908.
Prosopolepis Theobald, Mon. Culic., v, 574, 594, 1910.

The type species of *Prosopolepis* Lutz is *Prosopolepis confusus* Lutz.

Digitized by Google

GENERIC DIAGNOSIS OF ADULT FEMALE (MALE UNKNOWN):

Proboscis shorter than abdomen, the apical portion swollen; palpi short in female, male unknown; antennæ with the joints subequal, each joint with a single whorl of hairs near the base; eyes contiguous at vertex; clypeus clothed with scales. Prothoracic lobes moderately large, well separated. Vestiture of flat, appressed scales, some flat erect scales on nape. Mesonotum without setæ on disk; postnotum with setæ. Abdomen subcylindrical, blunt at tip. Legs rather long and slender; claws small, equal and simple.

The larva is unknown.

Forested regions of tropical America.

The genus *Prosopolepis* Lutz is founded on the presence of scales on the clypeus, absence of the same on the postnotum, the hind legs not ciliate. None of these characters are properly diagnostic of a genus, and we suspect that *Prosopolepis* may fall as a synonym of *Goeldia* Theobald, which appears to have a short, swollen proboscis, separated prothoracic lobes and the other characters of the genus before us. It is said to have scales on the postnotum, not on the clypeus.* We have no specimens of *Goeldia* before us, and so only call attention to this matter. *Prosopolepis* groups with *Joblotia* and *Lesticocampa* on the dorsally contiguous eyes and widely separated prothoracic lobes, but separates from them on the shorter, swollen proboscis, a character which has proved weak with larger groups of species.

The larval history and habits are unknown. We suspect, from the large size of the imago and its rarity, that the larva will prove to be predaceous.

The genus *Prosopolepis* is represented in our fauna by but a single species.

PROSOPOLEPIS JOCOSA Dyar & Knab.

Prosopolepis jocosa Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 64, 1908.
Prosopolepis jocosa Theobald, Mon. Culic., v, 627, 1910.

ORIGINAL DESCRIPTION OF PROSOPOLEPIS JOCOSA:

Female.—Proboscis moderately long and slender, the apical portion swollen, black-scaled; palpi short, slender, black-scaled; clypeus blackish, clothed with silvery gray scales; eyes contiguous; occiput dark-scaled, with faint metallic reflection, the margin of the eyes narrowly silver-gray-scaled; prothoracic lobes well separated, prominent, clothed with blackish scales, with faint luster; mesonotum dark-scaled, with faint metallic luster and with grayish reflections over the roots of the wings and on the scutellum; metanotum with a group of setæ near the apex and without scales; postscutellum with numerous long pale hairs and with dark scales like those of the abdomen; abdomen clothed above with blue-black scales, with very faint metallic luster; beneath silver-white-scaled, the lateral margins straight; tip of the abdomen with numerous coarse bristles; scales of the wing-veins brown, broad, those along the costa blue-black; legs dark-scaled, with blue and bronzy luster and without white markings; femora whitish beneath. Length, 4 mm.

One specimen, Caldera, Canal Zone, Panama. (A. H. Jennings.)

Type.—Cat. No. 11975, U. S. N. M.

The genus *Prosopolepis* Lutz was founded on the presence of scales on the clypeus, which is not a fundamental character. However, the species before us is separable from *Lesticocampa* by the slender proboscis of the latter, not enlarged at the tip, and we therefore recognize the generic name.

DESCRIPTION OF FEMALE OF PROSOPOLEPIS JOCOSA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather short, enlarged towards apex, labellæ with minute outstanding setæ; vestiture brownish black. Palpi short, one-sixth as long as proboscis, uniform, black, with a bronzy reflection, a few outstanding setæ. Antennæ slender, the basal joints about six times as long as wide, the terminal ones increasingly longer, rugose, coarsely pilose, black; tori subspherical with a cup-shaped apical excavation, luteous, shaded with blackish; hairs of the whorls

* Theobald states that he founds the genus *Goeldia* upon a single male sent him by Dr. Lutz from Brasil (Mon. Culic., iii, 330, 1903). We have reason to believe that this specimen, described by him as a male, is a female. The specimen which Theobald associates as the female appears to belong to some other species and is possibly not even congeneric. The status of the genus *Goeldia* can only be determined by a study of the type, and this, we are informed, can no longer be found.

Digitized by Google

sparse, rather long, black. Clypeus ovate, rounded, blackish brown, clothed with flat, appressed, small purplish-gray scales. Eyes black, contiguous at the vertex. Occiput smoothly clothed with flat appressed scales, black, with metallic grayish reflection; cheeks dull silvery, color extending up along margins of eyes but not reaching vertex; a row of erect, short, broad, forked black scales along posterior margin; two very long, coarse, black setæ at vertex, a row of long, black setæ along margin of eyes.

Prothoracic lobes large, elliptical, remote dorsally, luteous, densely clothed with flat blackish scales with greenish luster, a row of setæ along the anterior margin. Mesonotum brown, densely clothed with small elliptical scales, grayish brown; a row of bristles around the edges of the disk and the ante-scutellar area. Scutellum trilobate, vestiture of broad, flat dark-brownish scales with slight gray reflection, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, with a small tuft of setæ posteriorly. Pleuræ brown in middle, coxæ luteous, clothed with patches of silvery-white scales.

Abdomen subcylindrical, blunt at tip, with terminal bristles; dorsal vestiture black, without distinct metallic reflection; venter pale ocherous yellow, the colors separated on the sides in a straight line.

Wing narrow, slightly smoky; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein less than its own length behind anterior cross-vein; scales of veins elliptical, obliquely subtruncate at tip, brown, black on costa, dense, overlapping. Halteres black, except at base.

Legs moderate, vestiture not roughened, black with bronzy and blue reflection, femora paler beneath; apices of hind tibiæ and base of first tarsal joint ciliate for a short distance. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

We have no information on the life history and habits.

Panama.

One specimen, Caldera Island, Porto Bello Bay, adult captured (A. H. Jennings).

Genus LESTICOCAMPA Dyar & Knab.

Sabethes Giles (in part), Gnats or Mosq., 183, 1900.
Wyeomyia Theobald (in part), Mon. Culicid., ii, 267, 1901.
Joblotia Theobald (in part), Mon. Culic., iii, 334, 1903.
Joblotia Lutz (not Blanchard), in Bourroul, Mosquitos do Brasil, 56, 1904.
Joblotia Theobald (in part), Gen. Ins., Culicid., 33, 1905.
Joblotia Blanchard (in part), Les Moustiques, 428, 1905.
Lesticocampa Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 225, 226, 1906.
Trichoprosopon Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.
Lesticocampa Dyar & Knab, Proc. Biol. Soc. Wash., xix, 137, 1906.
Joblotia Theobald (not Blanchard), Mon. Culic., iv, 594, 1907.
Lesticocampa Dyar & Knab, Can. Ent., xxxix, 49, 1907.
Lesticocampa Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 248, 1907.
Joblotia Peryassú (not Blanchard), Os Culicid. do Brazil, 38, 1908.
Lesticocampa Williston, Man. No. Am. Dipt., 3 ed., 108, 1908.
Joblotina Pazos (in part), San. y Ben., ii, 42, 1909.
Lesticocampa Pazos, San. y Ben., ii, 44, 1909.
Trichoprosopon Theobald (in part), Mon. Culic., v, 556, 1910.
Lestitocampa Theobald, Mon. Culic., v, 621, 1910.
Joblotia Theobald (not Blanchard), Mon. Culic., v, 621, 1910.

The type species of *Lesticocampa* Dyar & Knab is *Wyeomyia lunata* Theobald.

Generic Diagnosis of Adult:

Proboscis long and slender, not swollen at the tip; palpi short in the female, short or long in the male, from one-eighth to nearly as long as the proboscis, very slender; eyes contiguous; clypeus without setæ or scales; antennæ with the joints subequal,

Digitized by Google

slightly more plumose in the male than in the female. Vestiture of flat, appressed scales, the head with a collar-like row of upright forked-scales on the nape. Mesonotum without setæ on the disk. Prothoracic lobes moderate, well separated dorsally. Abdomen subcylindrical, blunt at the tip. Legs long and slender, the hind ones ciliate in some species; claws small, equal and simple in the female, one claw of the hind pair very slender in some species; in the male unequal on the front and mid legs, some of them modified.

GENERIC DIAGNOSIS OF LARVA:

Maxillæ prominent, elongate, visible from above, armed with two large, unequal terminal teeth; air-tube spiculate, with a fringe of fine hair along the posterior margin; lateral comb of the eighth segment of few or many scales, either in a single row or in a patch; anal segment with dorsal plate and pair of subventral tufts; anal gills well developed.

Forested regions of tropical America.

The genus *Lesticocampa* has been recognized by Theobald and authors following him under the name *Joblotia* Blanchard. This is inadmissible, since *Joblotia* was proposed as a substitute for *Trichoprosopon* Theobald, which was considered preoccupied by *Trichoprosopus* Macquart. Lutz considered both names allowable, and proposed to use *Joblotia* for the forms here classified under *Lesticocampa,* which had been wrongly associated with *Trichoprosopon*= *Joblotia.* But as Blanchard has specified *nivipes* Theobald (=*digitatus* Rondani) as the type of *Joblotia,* any change is inadmissible. The statement of Theobald concerning the type species of *Lesticocampa, Wyeomyia lunata* Theobald, that "the hairs on the clypeus are quite distinct" (Mon. Culic., iii, 336, 1903) proves to be erroneous, and is corrected by him (Mon. Culicid., iv, 594, 1907); although afterwards again contradicted (Mon. Culic., v, 557, 1910) it is once more corrected (Mon. Culic., v, 621, 1910).

The larvæ are predaceous upon those of species of *Culex* or *Wyeomyia* living in the water between the flower-sheaths or leaves of different plants. These places often contain but little water and that of a slimy character. The larvæ are apparently wholly predaceous in their habits; they occur singly and the species are comparatively rare. The habits of the adults are unknown to us.

TABLES OF THE SPECIES.

ADULTS, STRUCTURE AND COLORATION.

1. Tarsi all black 2
   Mid tarsi only marked with white.... *lampropus* Howard, Dyar & Knab (p. 167)
   Hind tarsi marked with white 3
2. Scutellum metallic blue-scaled: palpi of male long.. *rapax* Dyar & Knab (p. 164)
   Scutellum with the mid lobe silver-scaled; palpi of the male short
   dicellaphora Howard, Dyar & Knab (p. 166)
3. Hind tarsi marked with white at bases of joints; mid tarsi without white
   schedocyclia Dyar & Knab (p. 174)
   White markings at the tips of mid and hind tarsi 4
4. Second hind tarsal joint not ciliate; tip of fourth joint white
   leucopus Dyar & Knab (p. 170)
   Second hind tarsal joint ciliate; over half of the fourth joint white 5
5. Palpi of female as long as six joints of antennæ.....*longipes* Fabricius (p. 172)
   Palpi of female as long as four joints of antennæ
   culicivora Dyar & Knab (p. 168)

ADULTS, MALE GENITALIA (LESTICOCAMPA AND JOBLOTIA).

1. Basal appendages contiguous, with short spines 2
   Basal appendages separate, with long spines 3
2. Basal lobe of side-piece beyond base, its setæ lateral
   L. dicellaphora Howard, Dyar & Knab (p. 167)
   Basal lobe of side-piece close to base, its setæ terminal
   J. digitatus Rondani (p. 179)
3. Side-pieces with three long setæ on inner margin 7
   Side-pieces without such setæ 4
4. Side-pieces long and very slender ..... *L. leucopus* Dyar & Knab (p. 171)
   Side-pieces moderate or stoutly conical 5
5. Basal appendages longer than wide ..... *J. trichorryes* Dyar & Knab (p. 184)
   Basal appendages wider than long 6

Digitized by Google

6. Side-pieces stout and conical..... *L. rapax* Dyar & Knab (p. 165)
Side-pieces more slender and elongate
L. lampropus Howard, Dyar & Knab (p. 168)
7. Harpes and harpagones prominently exserted. *L. culicivora* Dyar & Knab (p. 170)
Harpes and harpagones not exserted..... *L. longipes* Fabricius (p. 173)

The following species are not included, as we have no males: *Lesticocampa schedocyclia* Dyar & Knab, *Joblotia mogilasia* Dyar & Knab.

LARVÆ.

1. Mandibles visible from above; lateral comb of the eighth abdominal segment of about seventeen spines in a patch..... *rapax* Dyar & Knab (p. 165)
Mandibles not visible from above..... 2
2. Lateral comb of 4 scales..... *culicivora* Dyar & Knab (p. 170)
Lateral comb of many scales in a long line
dicellaphora Howard, Dyar & Knab (p. 167)

The following species are not included, their larvæ being undiscovered: *schedocyclia* Dyar & Knab, *leucopus* Dyar & Knab, *longipes* Fabricius, *lampropus* Howard, Dyar & Knab.

LESTICOCAMPA RAPAX Dyar & Knab.

Lesticocampa lunata Dyar & Knab (not Theobald), Journ. N. Y. Ent. Soc., xiv, 226, 1906.
Lesticocampa rapax Dyar & Knab, Proc. Biol. Soc. Wash., xix, 137, 1906.
Lesticocampa rapax Theobald, Mon. Culic., v, 621, 1910.

ORIGINAL DESCRIPTION OF LESTICOCAMPA RAPAX:

♂; head clothed with dull violet scales behind, with a row of black erect forked scales; thorax with dull brown scales with faint purple reflection; pleurae and coxae silvery; abdomen dull steel blue, violaceous in certain light, the first segment with brighter blue scales, 8th with bright violet scales, golden at the sides; venter golden; last segment bright violet blue with numerous bristles below. Legs entirely violet blue. Palpi longer than the antennæ, upcurved.

♀; similar to the male, palpi short, as long as four joints of the antennae.

1 ♂, Trinidad, B. W. I. (F. W. Urich), bred from larvæ described as *Lesticocampa lunata* Theob. (Dyar & Knab, Journ. N. Y. ent. soc., xiv, 226, 1906); 3 ♀, Sao Paulo, Brazil (A. Lutz); Patulue, Guatemala (D. G. Elsen).

Type.—Cat. No. 9981, U. S. Nat. Mus.

DESCRIPTION OF MALE AND LARVA OF LESTICOCAMPA RAPAX (FEMALE UNKNOWN):

Male.—Proboscis long, slender, labellæ rounded, with minute outstanding setæ; vestiture black. Palpi long and slender, slightly shorter than proboscis, uniform black, with a violet and bronzy reflection, a few outstanding setæ on last two joints and tip of the long joint. Antennæ long, pilose, black, the last two joints long and slender, the others shorter, about four times as long as wide, thickened medially, dark with pale basal rings; tori subspherical, with a cup-shaped apical excavation, luteous, shaded with blackish; hairs of whorls long, moderately abundant, black. Clypeus broad, rounded, blackish brown, nude, with a slight pruinosity. Eyes black, contiguous at the vertex. Occiput smoothly clothed with flat appressed scales, black with metallic-blue reflection, silvery in some lights, a row of erect, forked black scales along the posterior margin, two long bristles at vertex, a row of setæ along margins of eyes.

Prothoracic lobes rather large, elliptical, remote dorsally, luteous, sparsely clothed with small silvery scales, a row of setæ along anterior margin; mesonotum brown, densely clothed with narrow scales, grayish brown, with a submetallic purplish reflection, a row of bristles around edges of disk and about the ante-scutellar space; scutellum trilobate, vestiture of broad, flat, shining, pale metallic-blue scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, luteous brown, with a tuft of small setæ posteriorly. Pleuræ luteous, brownish shaded, coxæ luteous, clothed with patches of silvery-white scales.

Abdomen subcylindrical, dorsal vestiture black with a blue and violet metallic reflection; venter golden yellow, the colors separated on the sides in a segmentary angulated line, a black shade along mid-ventral line; claspers black.

Digitized by Google

Wings narrow, hyaline; petiole of second marginal cell one-half as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant nearly its own length from anterior cross-vein; outstanding scales of veins elliptical, brown, with a blue reflection. Halteres with brown stems and black knobs.

Legs moderate, slender, black, with violet and blue reflection, the femora with a whitish reflection beneath; spines on hind tibiæ large. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Genitalia (plate 7, fig. 45): Side-pieces about twice as long as wide, stoutly conical; basal lobes large, rounded, with many long setæ. Clasp-filament long, slender, with inserted terminal claw. Harpes prominent, with thickened margin and spinose tip. Harpagones and unci somewhat prominently exserted, forming basal cones. Basal appendages short and broad, approximated, each bearing a row of long, very coarse setæ.

Larva, Stage IV (plate 94, fig. 304).—Head (plate 131, fig. 464) rounded quadrate, longer than wide, the side slightly arcuate; mouth-parts, especially the maxillæ, strongly prominent. Antennæ slender, about half as long as maxillæ, a single hair at outer fourth; a long hair, three short ones and a digit at tip; head-hairs single. Mental plate broadly triangular, a square excavation at tip, each side of which is a stout tooth with six more on each side, the last one small. Mandible rounded quadrate, two filaments before tip; a short row of cilia from a collar; dentition of four teeth on a stout prominence, the first tooth broadly triangular; two spines before, a broad, serrate filament and three stout hairs with divided tips within; margin below the prominence roundedly angled at base, a row of hairs on margin; a row of hairs within below the dentition and another at base. Maxilla elongate conical, slender, divided by a suture; inner half with a long horn at tip; outer half with a short horn, a spine, and two small teeth. Palpus long, slender, thicker at base with four small apical digits, much resembling the antennæ in size and shape. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter. Air-tube slender, slightly tapered, minutely spicular; a fringe of very fine hairs along posterior margin; two stout spines at tip in front. Lateral comb of eighth segment of two rows of smooth, thorn-shaped spines. Anal segment about as long as wide, with a dorsal plate reaching well down the sides; dorsal tuft a long hair and brush on each side; a long single hair at lateral angle of plate; subventral tufts long and multiple. Anal gills very long, over four times as long as the segment, evenly tapered to a pointed tip.

Mr. Urich found the larva in water held by the leaf-bases of Bromeliaceæ, associated with species of *Culex* (*Microculex*), upon which they are predaceous. He reared from these plants also *Culex imitator* Theobald, *C. pleuristriatus* Theobald, *C. azymus* Dyar & Knab, and *C. inimitabilis* Dyar & Knab, as well as *Megarhinus superbus* Dyar & Knab. We suppose that mosquito larvæ living in the water in bromeliaceous plants constitute the only food of this species. The adults are rare; we have no information about their life history.

Island of Trinidad, West Indies.

Arima (F. W. Urich).

Our specimen was originally identified as *Joblotia lunata* Theobald, but owing to Theobald's erroneous statement that this species possesses hairs on the clypeus (Mon. Culic., iii, 336, 1903), it was redescribed as *Lesticocampa rapax* by Dyar & Knab. We possess two specimens of the true *lunata*, kindly sent us by Dr. Lutz from São Paulo, Brazil, and find them to differ from the Trinidad form in

Digitized by Google

the coloration of the scutellum, which is brown, concolorous with the mesonotum in *lunata,* but bright metallic green, contrasting with the brown mesonotum in *rapax.* We therefore retain this name for the Trinidad form, which doubtless represents a distinct species. We possess but a single specimen, a male.

Lesticocampa rapax was described from 4 specimens. Of these we leave the male from Trinidad to represent the species, referring the 2 females from Brazil to *Lesticocampa lunata* Theobald, and the specimen from Guatemala to *Lesticocampa culicivora* Dyar & Knab.

LESTICOCAMPA DICELLAPHORA, new species.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF LESTICOCAMPA DICELLAPHORA:

Female.—Proboscis long, slender, labellæ rounded, with minute outstanding setæ; vestiture brownish black. Palpi short, one-sixth as long as proboscis, bronzy black, with a few outstanding setæ. Antennæ slender, basal joint about four times as long as wide, terminal ones increasingly somewhat longer, rugose, coarsely pilose, especially on the last two joints, black; tori subspherical with a cup-shaped apical excavation, luteous brown, darker within; hair of the whorls sparse, moderate, black. Clypeus elongate, rounded, blackish, nude, with a slight pruinosity. Eyes black, contiguous at the vertex. Occiput smoothly clothed with flat appressed scales, blackish, a large vertical patch with a metallic reflection, silvery in some lights; a row of erect, forked black scales along posterior margin; sides and underside of head silvery; a row of setæ along margins of eyes, two coarse bristles at vertex.

Prothoracic lobes rather large, elliptical, remote dorsally, brown, sparsely clothed with pale iridescent scales, apices with dark scales; a row of coarse setæ along the anterior margin. Mesonotum brown, clothed with long, narrow, curved scales, dark brown, with a slight bronzy luster; the anterio-lateral margins silver-scaled; a row of bristles around edges of disk. Scutellum trilobate, vestiture of broad, flat scales, middle lobe silvery, lateral lobes dark brown, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, with a tuft of small setæ posteriorly. Pleuræ dark brown, coxæ luteous, clothed with patches of silvery-white scales.

Abdomen subcylindrical, blunt at tip, with a terminal tuft of bristles; dorsal vestiture black with a brown and bluish submetallic reflection; venter yellowish silvery, colors separated on sides in a straight line.

Wings moderate, hyaline; petiole of second marginal cell two-thirds as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant less than its own length from anterior cross-vein; outstanding scales of the veins rather narrowly elliptical, denser and broader on forks of second vein and at tip of third vein, brown with a blue reflection. Halteres with brown stems and black knobs.

Legs long and slender, black, with a bronzy and blue reflection, slightly paler beneath, femora yellowish at base below; hind tibiæ with scales slightly roughened, also on base of first tarsal joint; no white markings. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Antennæ sparsely plumose, with the last two joints long and slender, rugose, black, with long pile, the other joints shorter, about five times as long as wide, with a large whorl at base and a secondary hair-whorl at middle, brown, hairs of basal whorls long, black. Proboscis long and slender, curved. Palpi about one-eighth as long as proboscis, short, slender. Coloration as in female. Abdomen slightly expanded at tip, the claspers prominent, the last segment and genitalia entirely blue-black scaled below. Fore tarsi with the claws unequal,

Digitized by Google

the larger one toothed; mid tarsi with a single claw which bears a large tooth near the tip and a fringe of dense, sharp spines arising sublaterally; claws of hind tarsi very small, equal and simple; formula, 1.0–1–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Type: No. 12708, U. S. Nat. Mus.

Genitalia (plate 7, fig. 43): Side-pieces about three times as long as wide, the tips rounded, uniform, setose; a short densely tubercular and setose lobe near the base. Clasp-filament long, slender, uniform, with a long terminal claw. Harpes narrowly elliptical with revolute margins, the tips rounded and bearing two stout remote teeth. Unci forming a narrow basal projection. Basal appendages small, rounded, well separated and setose.

Larva, Stage IV (plate 94, fig. 305).—Head rounded, sides tapering before, rounded in front; mouth brushes rudimentary, antennæ small, uniform, slender, with a minute hair at the outer third; mandibles small, terminal tooth much larger than the others; maxillæ elongated, narrow, well chitinized and bearing two stout teeth at tip; mental plate transverse, with fine teeth, the central tooth larger and depressed. Thoracic hairs abundant but short, one of the lateral tubercles bearing a brush of fine, dense hairs. Abdominal hairs very fine and small, except the lateral ones, which are long, coarse and single. Lateral comb of eighth segment of numerous spines in a long, straight row arising from a basal collar-like chitinization, the single spines long and pointed. Air-tube about five times as long as wide, tapering regularly outwardly, finely spicular, and with a fringe of long, very fine hairs along posterior margin; a fine tuft of similar hairs on dorsal aspect near tip; a heavy black basal ring; terminal hooks stout, moderate, conspicuous. Anal segment short; dorsal plate with black anterior margin and posteriorly emarginate between the hair-tufts, dorsal tip projecting; dorsal tuft of two long hairs and a short one on each side; lateral hair long, single; subventral tufts of four rather long hairs. Anal gills long and slender.

Mr. Jennings obtained the larvæ from water accumulated in the flower-bracts of *Calathea discolor*, where they were associated with the larvæ of *Wyeomyia eloisa*, upon which they were presumably feeding.

Panama.

Miraflores, Canal Zone, February 8, 1909 (A. H. Jennings); Tabernilla, Canal Zone, April 16, 1909 (A. H. Jennings).

This interesting and peculiar species has remained heretofore unknown because the plant *Calathea* had been neglected by collectors until Mr. Jennings made investigation of its guests. Every water-bearing plant in the tropics should be separately investigated, as it will probably be found that each has a fauna of its own, both of vegetable-feeding and predaceous forms, which are not obtained by general collecting.

LESTICOCAMPA LAMPROPUS, new species.

DESCRIPTION OF FEMALE AND MALE OF LESTICOCAMPA LAMPROPUS (LARVA UNKNOWN):

Female.—Proboscis long, slender, labellæ rounded, with minute outstanding setæ; vestiture brownish black. Palpi short, one-fourth as long as proboscis, bronzy black, with a few outstanding setæ. Antennæ slender, basal joint about four times as long as wide, terminal ones increasingly somewhat longer, rugose, coarsely pilose, especially on last two joints, black; tori subspherical, with a cup-shaped apical excavation, luteous, brown within, with fine setæ; hairs of whorls sparse, moderate, black. Clypeus elongate, blackish, nude, with a slight pruinosity. Eyes black, contiguous at vertex. Occiput smoothly clothed with flat appressed scales, blackish with a metallic blue reflection, a paler margin along

Digitized by Google

the eyes, the whole silvery blue in some lights; a row of erect, forked black scales along posterior margin; sides below yellowish silvery; a row of setæ along margin of eyes, a pair of coarse bristles at vertex.

Prothoracic lobes rather large, elliptical, remote dorsally, brown, sparsely clothed with small silvery scales with blue reflection; a row of setæ along anterior margin. Mesonotum brown, clothed with long, narrow, curved scales, dark brown with a slight bronzy luster; a row of bristles around edges of disk. Scutellum trilobate, vestiture of broad, flat scales, metallic greenish-blue, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, luteous brown, with a tuft of small setæ posteriorly. Pleuræ luteous brown, coxæ luteous, clothed with patches of silvery-white scales.

Abdomen subcylindrical, blunt at tip, with a terminal tuft of bristles; dorsal vestiture metallic violet-blue; venter pale golden, colors separated on sides in a straight line, the venter with a broad median stripe of dull bronzy scales.

Wings rather narrow, smoky hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein slightly beyond anterior cross-vein; outstanding scales of veins rather broad, obliquely subtruncate, somewhat broader on forks of second vein, brown, with a blue reflection. Halteres with brown stems and black knobs.

Legs long and slender, dark violet-blue, with a slight bronzy reflection; mid tarsi with tip of second joint, and all of the third and fourth silvery white on outer side. Claw formula, 0.0–0.0–0.0; one claw of hind legs very slender.

Length: Body about 5.5 mm.; wing 4.5 mm.

Male.—Antennæ with last two joints long and slender, rugose, black, with long pile, the other joints shorter, about five times as long as wide, with a long whorl at base of each joint; brown, the hairs long, sparsely plumose, black. Proboscis long and slender, curved. Palpi about three-fourths as long as proboscis, very slender. Coloration as in the female. Abdomen slightly expanded at tip, the claspers prominent, the last segment violet blue below. Wing slightly narrower than in the female, the stems of the fork-cells longer, basal cross-vein slightly before anterior cross-vein. Fore tarsi with the claws unequal, simple, strongly recurved; mid tarsi much the same; hind claws small, equal, and simple; formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Type: No. 12709, U. S. Nat. Mus.

Genitalia (plate 7, fig. 44): Side-pieces over twice as long as wide, rounded, setose; clasp-filament long and slender, uniform, with a small terminal claw; basal lobe large, rounded, with long setæ. Harpes elliptical, rather narrow and long, margins revolute, tips thickened and bearing stout teeth. Basal appendages well separated, large, broader than long, bearing very long, coarse setæ.

The larvæ are predaceous; Mr. Jennings found them feeding upon *Joblotia digitatus*, eating both the larvæ and pupæ. They were in a palm-spathe upon the ground.

Panama.

Upper Pequini River, March 30, 1909 (A. H. Jennings).

LESTICOCAMPA CULICIVORA Dyar & Knab.

Lesticocampa rapax Dyar & Knab (in part), Proc. Biol. Soc. Wash., xix, 137, 1906.
Lesticocampa culicivora Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 207, 1907.
Lesticocampa culicivora Busck, Smiths. Misc. Colls., quart. iss., iii, 76, 1908.
Lesticocampa ? culicivora Theobald, Mon. Culic., v, 558, 1910.

ORIGINAL DESCRIPTION OF LESTICOCAMPA CULICIVORA:

♀.—Proboscis long and slender; palpi not as long as three joints of the antennæ, slender, black; clypeus black, shining, nude; occiput clothed with flat deep blue

Digitized by Google

scales; prothoracic lobes large, prominent, well separated, with a few silvery scales; mesothorax compressed, covered with steel-blue scales; scutellum clothed with flat broad shining bright-blue scales; metanotum deep brown, a group of setæ towards the apex; abdomen long and slender, subcylindrical, the segments somewhat constricted beneath, above clothed with steel-blue scales, beneath with yellowish silvery ones with an undulate lateral margin; wings long and narrow, hyaline, the cross-veins nearly incident; legs long and slender, the hind legs with outstanding scales on the apical portion of the tibiæ and particularly on the second joint of the tarsi; forming a short lateral fringe; black with violet-blue reflection, the tarsi of the middle legs with the apical half of the second and the succeeding segments silvery white, of the hind legs with the last two joints white. Length, 5 mm.

One specimen, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in flowers of *Heliconia*, associated with some unbred long-tubed larvæ, probably a species of *Culex*.

Type.—No. 10849, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF LESTICOCAMPA CULICIVORA:

Female.—Proboscis long, slender, labellæ rounded, with minute outstanding setæ; vestiture brownish black. Palpi short, one-sixth as long as proboscis, uniform black, with a bronzy reflection, a few outstanding setæ. Antennæ slender, basal joints about four times as long as wide, the terminal ones increasingly somewhat longer, rugose, coarsely pilose, especially on the last two joints, black; tori subspherical, with a cup-shaped apical excavation, luteous brown, darker within; hairs of whorls sparse, moderate, black. Clypeus broad, rounded, blackish brown, nude, with a slight pruinosity. Eyes black, contiguous at the vertex. Occiput smoothly clothed with flat appressed scales, black with bright metallic-blue reflection, silvery in some lights, a row of erect, forked black scales along posterior margin; two coarse bristles at vertex, a row of setæ along margins of eyes.

Prothoracic lobes rather large, elliptical, remote dorsally, luteous, sparsely clothed with small pale iridescent scales, a row of coarse setæ along anterior margin. Mesonotum brown, clothed with small elliptical scales, brown with a submetallic-blue reflection, brighter and more greenish posteriorly; a row of bristles around edges of disk; scutellum trilobate, vestiture of broad, flat metallic-greenish scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, with a tuft of small setæ posteriorly. Pleuræ dark brown centrally, coxæ luteous, clothed with patches of silvery-white scales.

Abdomen subcylindrical, with a terminal tuft of bristles; dorsal vestiture black with a blue metallic reflection; venter yellowish silvery, the colors separated on the sides in a segmentarily undulating line, the scales somewhat roughened and projecting along the median line.

Wings narrow, hyaline; petiole of second marginal cell one-half as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein slightly beyond the anterior cross-vein; outstanding scales of veins narrowly elliptical, denser and broader on forks of second vein, brown with a blue reflection. Halteres with brown stems and black knobs.

Legs long, slender, black with metallic-blue reflection, the femora with a whitish reflection beneath; hind legs with outstanding scales on outer half of tibia and first to third tarsal joints, especially prominent at apex of tibia, base of first tarsal joint and on second joint; hind tarsi with the fourth joint, except at base, and all of fifth joint white; mid tarsi with the apical half of second, and all of the third and fourth joints white beneath, the last three yellowish white above, submetallic. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Antennæ with last two joints long and slender, rugose, black, with long pile; the other joints shorter, about five times as long as wide, with a large whorl at base and a secondary hair whorl at middle, brown, hairs of basal whorls long,

Digitized by Google

sparsely plumose, and black. Proboscis very long and slender, curved. Palpi about two-thirds as long as proboscis, slender, uniform, the last two and apex of the long joints with a few short, coarse, outstanding setæ. Coloration as in the female. Abdomen laterally expanded at tip, the last segment and genitalia entirely blue-black scaled below; separation of color on sides less sharply angular than in the female. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4.5 mm.

Genitalia (plate 7, fig. 48): Side-pieces over twice as long as wide, strongly tapered to a small tip; three long setæ on inner margin; basal lobes very large, rounded, setose. Clasp-filament long, slender, with a short terminal claw. Harpes prominent, with thickened margin and spinose tip. Harpagones and unci forming basal cones, the harpagones prominently exserted. Basal appendages moderate, bearing very long setæ.

Larva, Stage IV (plate 94, fig. 306).—Head well rounded, broader than long, without prominent angles; antennæ moderately long, but very slender, weak and flexuous near the base; maxillæ strongly projecting, fringed with evenly-spaced hairs on inner side, a long terminal tooth projecting inward at right angles, second tooth small and concealed from dorsal view; mandibles not visible from above; all head-hairs single. Lateral abdominal hairs multiple on first two segments, single on fourth to sixth. Lateral comb of eighth segment of four teeth somewhat irregularly placed. Air-tube long, flared at base, slender outwardly and slightly curved forward, about five times as long as basal width, eight times as long as diameter at basal fourth; evenly covered with small, stout spines; three fine hairs on dorsal aspect near the tip; a row of densely placed tufts along ventral line of three or four long, very fine hairs each, running from base to tip, in all about thirty tufts. Anal segment longer than wide, with a large dorsal plate; dorsal tuft of a group of three and another of five long hairs on each side; lateral hair long, single, arising from angle of plate; subventral tufts multiple, long, detached. Anal gills about five times as long as the segment, large and stout, gradually tapering to their tips, equal in length.

The larvæ are predaceous, feeding upon the larvæ of species of *Wyeomyia* living in the fluid in the flower-sheaths of plants of the genus *Heliconia;* they occur singly. The adults are rare; we have no information about their habits.

Panama and Guatemala.

Patulue, Guatemala, 700 feet, adult captured (G. Eisen); Tabernilla, Canal Zone, Panama, larvæ in flower-sheaths of *Heliconia,* predaceous on the larvæ of *Wyeomyia galoa,* April 28, 1907 (A. Busck); Las Cascadas, Canal Zone, Panama, larva in flower-sheaths of "banana bromelia" (*Heliconia*), February 2, 1908 (A. H. Jennings); Gorgona, near Carabali River, Canal Zone, Panama, larva in "banana bromelia" (*Heliconia*), February 7, 1908 (A. H. Jennings); San Pablo, Canal Zone, Panama, larva in same plant, February 17, 1908, "plants contained abundant water, while the true bromelias were dry" (A. H. Jennings); Gatun, Canal Zone, Panama, pupa from same plant, March 11, 1908 (A. H. Jennings); Tabernilla, Canal Zone, Panama, larva from flower-cups of "wild plantain" (*Heliconia*) from edge of clearing, March 12, 1908 (A. H. Jennings); Tabernilla, Canal Zone, Panama, from flower-spathes of *Heliconia,* February 4, 1909 (A. H. Jennings).

One of the type specimens of *Lesticocampa rapax* (Patulue, Guatemala) we find belongs to this species (*L. culicivora*).

LESTICOCAMPA LEUCOPUS Dyar & Knab.

Lesticocampa leucopus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 137, 1906.
Lesticocampa leucopus Busck, Smiths. Misc. Colls., quart. iss., iii, 76, 1908.
Lesticocampa leucopus Theobald, Mon. Culic., v, 622, 1910.

Digitized by Google

ORIGINAL DESCRIPTION OF LESTICOCAMPA LEUCOPUS:

Palpi of ♀ as long as six joints of the antennæ; hind tarsi white at tip.

5 specimens, Bluefields, Nicaragua (W. F. Thornton); Bocas del Toro, Panama (P. Osterhout).

Type.—Cat. No. 10,003, U. S. Nat. Mus.

DESCRIPTION OF FEMALE AND MALE OF LESTICOCAMPA LEUCOPUS (LARVA UNKNOWN):

Female.—Proboscis long, slender, uniform, labellæ rounded, with minute outstanding setæ; vestiture brownish black. Palpi moderate, one-fifth as long as proboscis, uniform black, with a blue reflection, a few outstanding setæ. Antennæ moderate, basal joints about four times as long as wide, the terminal ones increasingly longer, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous, shaded with blackish; hairs of whorls long, sparse, moderate, black. Clypeus broad, rounded, blackish brown, nude, with a slight pruinosity. Eyes black, contiguous at the vertex. Occiput smoothly clothed with flat appressed scales, black with metallic-blue reflection, silvery in some lights, a row of erect forked black scales along the posterior margin, a row of setæ along margins of eyes, two coarse bristles at vertex.

Prothoracic lobes large, elliptical, remote dorsally, luteous, sparsely clothed with small silvery scales, a row of setæ along anterior margin. Mesonotum brown, clothed with narrowly elliptical scales, grayish brown, with a submetallic-purplish reflection, a row of bristles around edges of disk and ante-scutellar region. Scutellum trilobate, vestiture of broad, flat metallic blue and green scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, with a median carina, dark brown, with a tuft of small setæ posteriorly. Pleuræ dark brown in the middle, coxæ luteous, clothed with patches of silvery-white scales.

Abdomen subcylindrical, with many stout terminal bristles; dorsal vestiture black with a blue metallic reflection; venter golden yellow, the colors separated on the sides in a line indented on fifth, sixth, and seventh segments.

Wings rather narrow, slightly infuscated; petiole of second marginal cell one-half as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein nearly its own length beyond anterior cross-vein; outstanding scales of veins narrowly elliptical, brown, with green reflection. Halteres black, brown at the base.

Legs long, slender, black with purple metallic reflection, the femora with brassy reflection beneath nearly to apices; spines on hind tibiæ large; vestiture somewhat roughened; hind legs with apical portion of tibia and basal portion of first tarsal joint ciliate, apical third of fourth tarsal and all of the fifth joint white; mid tarsi with last three joints and apex of the second with yellowish-silvery sheen, white below. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Antennæ with last two joints long and slender, rugose, black, with long pile; the other joints about four times as long as wide, with very slightly thickened rings at the insertions of the hair-whorls, blackish, slightly paler before the rings; hairs long, moderate, not plumose, black, a secondary whorl of small hairs at middles of joints. Proboscis long and slender, black. Palpi about two-thirds as long as the proboscis, very slender, uniform, the last two joints with a few short coarse outstanding setæ. Coloration as in the female. Wings slightly narrower than in the female, the stems of the fork-cells longer. Abdomen long, slender, expanded at tip, last segment and genitalia blue-black scaled below, with lateral basal spots of golden scales. Claw formula, 0.0–0.0–0.0.

Length: Body about 5.5 mm.; wing 4 mm.

Genitalia (plate 7, fig. 47): Side-pieces very slender, about five times as long as wide; basal lobes large, setose. Clasp-filament long and slender, with a small

Digitized by Google

terminal claw. Harpes prominent, with thickened inner margin and bent spinose tip. Harpagones and unci forming basal cylinders, not prominent. Basal appendages small, rather slender, with five or six long terminal setæ.

Life history and habits unknown.

East coast of Nicaragua to Panama.

Bluefields, Nicaragua, adults captured (W. F. Thornton); Bocas del Toro, Panama, September 25 and 28, 1903 (P. Osterhout).

LESTICOCAMPA LONGIPES (Fabricius).

Culex longipes Fabricius, Syst. Antliat., 34, 1805.
Culex longipes Wiedemann, Dipt. Exot., i, 36, 1821.
Sabethes longipes Robineau-Desvoidy, Mém. Soc. d'Hist. Nat. Paris, iii, 412, 1827.
Culex longipes Wiedemann, Aussereur. zweifl. Ins., i, 7, 1828.
Culex longipes Macquart, Hist. Nat. Ins., Dipt., i, 36, 1834.
Sabethes longipes Giles, Gnats or Mosq., 183, 1900.
Lesticocampa ulopus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 137, 1906.
Lesticocampa ulopus Busck, Smiths. Misc. Colls., quart. iss., iii, 75, 1908.
Lesticocampa ulopus Theobald, Mon. Culic., v, 622, 1910.

ORIGINAL DESCRIPTION OF CULEX LONGIPES:

longipes.—2. C. ater cupro nitidulus, pedibus elongatis: tibiis posticis ciliatis. Habitat in America meridionali Dom. Smidt. Mus. Dom. Lund. Paullo major C. pipiente. Haustellum exsertum, apice parum incrassatum. Antennae valde pectinatae. Thorax et abdomen atra, parum cupro nitidula. Alae obscurae. Pedes elongati tibiis compressis, ciliatis: tarsis apice parum albicantibus.

ORIGINAL DESCRIPTION OF LESTICOCAMPA ULOPUS:

Palpi of ♀ as long as six joints of the antennæ; mid and hind tarsi white at tip. One specimen, Bluefields, Nicaragua (W. F. Thornton).
Type.—Cat. No. 10,004, U. S. Nat. Mus.

DESCRIPTION OF FEMALE AND MALE OF LESTICOCAMPA LONGIPES (LARVA UNKNOWN):

Female.—Proboscis long, slender, labellæ long with minute outstanding setæ; vestiture brownish black. Palpi short, one-sixth as long as proboscis, uniform black, with a bronzy reflection, a few outstanding setæ. Antennæ slender, basal joints about four times as long as wide, the terminal ones increasingly longer, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous, shaded with blackish; hairs of whorls sparse, long, black. Clypeus broad, rounded, blackish brown, nude, with a slight pruinosity. Eyes black, contiguous at vertex. Occiput smoothly clothed with flat appressed scales, black with metallic blue and silvery reflection, a row of erect, forked black scales along posterior margin, a row of setæ along margins of eyes, two coarse bristles at vertex.

Prothoracic lobes large, elliptical, remote dorsally, luteous, sparsely clothed with small silvery scales, a row of setæ along anterior margin. Mesonotum brown, densely clothed with small elliptical scales, grayish brown, with a submetallic purplish and greenish reflection, a row of bristles around edges of disk and ante-scutellar area. Scutellum trilobate, vestiture of broad, flat scales with blue and green metallic reflection, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, with a tuft of small setæ posteriorly. Pleuræ dark brown in the middle, coxæ luteous, clothed with patches of silvery-white scales.

Abdomen subcylindrical, compressed, truncate apically, with terminal bristles; dorsal vestiture black with a blue metallic reflection; venter golden yellow, colors separated on sides in a line, deeply indented on fifth and sixth segments, the last segment black beneath.

Wings rather narrow, smoky; petiole of second marginal cell less than half as long as its cell, that of second posterior cell shorter than its cell; basal cross-

Digitized by Google

vein slightly beyond anterior cross-vein; scales of veins narrowly elliptical, brown, with a bronzy reflection, denser and broader on forks of second vein, except at base. Halteres black.

Legs long, slender, black with violet and blue reflection, the scales somewhat roughened, the femora with a yellowish-white reflection beneath; spines on hind tibiæ large; hind tarsi with dense outstanding scales on apex of first and on the second and third joints; apical portion of hind tibiæ ciliate, tarsals with the tip of the third, all of the fourth and fifth joints white; mid tarsi with apical half of second and all of third and fourth joints white beneath, a brassy sheen above. Claw formula, 0.0–0.0–0.0; one claw of the hind pair very slender.

Length: Body about 6 mm.; wing 5 mm.

Male.—Antennæ long and slender, with last two joints long, rugose, black, with long pile; the other joints short, about five times as long as wide, with slightly thickened rings at insertions of hair-whorls, brown, with pale rings below the whorls; hairs long, sparsely plumose, and black, a small secondary whorl at middle. Proboscis long and slender. Palpi about two-thirds as long as proboscis, very slender, uniform, last two joints with a few short, coarse outstanding setæ. Coloration as in female. Wings hardly narrower than in the female, the stems of the fork-cells longer, basal cross-vein within anterior one. Abdomen expanded at tip, the last segment and genitalia entirely blue-black scaled below; separation of the colors on the sides less sharply angular than in the female. Claw formula, 0.0–0.0–0.0.

Length: Body about 5.5 mm.; wing 4 mm.

Genitalia (plate 7, fig. 46): Side-pieces about three times as long as wide, conically tapered at tip; three long setæ on the inner margin; basal lobes large, rounded, setose. Clasp-filament long and slender, with a terminal claw. Harpes prominent, with thickened inner margin and curved spinose tip. Harpagones and unci small, not prominent. Basal appendages slender, with long terminal setæ.

Of the life history and habits Mr. Busck says:

"The larva lives between the stalk and the leaf stalk of a juicy large-leaved, dark-green plant, which reminds one of *Monstera deliciosa*. The space in these leaf-corners is so limited and the amount of water they hold so small and so slimy from the plant's juice that it would hardly be suspected to harbor mosquitoes; and yet the plant probably has another Sabethid peculiar to it upon which the present species preys."

We have no information about the habits of the adult.

Tropical South America to Nicaragua.

Bluefields, Nicaragua, adults captured (W. F. Thornton); Lion Hill, Canal Zone, Panama, adults captured (A. Busck); Tabernilla, Canal Zone, Panama, a pupa in leaf-sheaths of undetermined plant in bamboo woods, July 18, 1907 (A. Busck); Tabernilla, Canal Zone, Panama, larva in flower-cup of "wild plantain," March 12, 1908 (A. H. Jennings). Also recorded from "South America" (Fabricius), we suspect from the Northern portion, perhaps the Guianas.

Lesticocampa longipes was apparently first misidentified by Macquart, who thought it identical with a species of *Sabethes*. He assumed that Fabricius and Wiedemann were in error in describing the hind legs as ciliate, instead of the middle ones. He was followed in this by Arribálzaga, Theobald, Blanchard, and other authors, the name *longipes* being now very generally applied to a species of *Sabethes*. We find the present species to agree with Fabricius's description, supplemented by that of Wiedemann, who had before him the type. They distinctly state that all the tibiæ are hardly ciliate, but the tarsi of the hind legs almost shaggy. Our species also agrees in coloration, so that we feel as certain of the

Digitized by Google

identification as is possible without an examination of types or knowledge of Fabricius's exact locality. Recently Dr. Arthur Neiva has examined this type in the museum at Copenhagen and confirms our determination.

LESTICOCAMPA SCHEDOCYCLIA Dyar & Knab.

Lesticocampa schedocyclia Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 64, 1908.
Lesticocampa schedocyclia Theobald, Mon. Culic., v, 622, 1910.

ORIGINAL DESCRIPTION OF LESTICOCAMPA SCHEDOCYCLIA:

Female.—Proboscis long, moderately slender, not swollen at the apex, clothed with black scales with bluish iridescent reflection; palpi slender, about two-fifths the length of the proboscis, clothed with black scales, with blue iridescent luster; occiput clothed with flat iridescent scales, blue and green predominating, and quite dark in appearance in some lights, in other lights entirely silvery; there is a large silver patch on the vertex; prothoracic lobes well separated, the upper portion clothed with dark blue and violet iridescent scales, the lower portion with silvery white scales; mesonotum brown-scaled, with bronzy luster; scutellum clothed with flat, light greenish, and iridescent scales; metanotum with a group of setæ near the apex, without scales; postscutellum clothed with blue and green iridescent scales; abdomen long and slender, subcylindrical, blunt at the end, clothed above and at the sides with dark scales, which show blue, green, and bronzy reflections; beneath white-scaled, the lateral margins shallowly indented on each segment; tip of the abdomen with numerous coarse bristles; veins of the wings clothed with bronzy brown broad scales; legs mostly dark-scaled, with blue, bronzy, and iridescent reflections; femora pale-scaled beneath; front and mid legs without white markings; hind legs with a white spot at the apex of the femora beneath, a white spot on the under sides of the tibiæ beyond the middle, the tarsi with basal white dashes on the under side, becoming progressively longer on each segment and reaching nearly to the apex of the fifth joint; legs without ciliation. Length, 4 mm.

Two specimens, interior of Nicaragua, without precise locality. (Dr. F. W. Thornton.)

Type.—Cat. No. 11974, U. S. N. M.

DESCRIPTION OF FEMALE OF LESTICOCAMPA SCHEDOCYCLIA (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, slender, uniform, labellæ long, with minute outstanding setæ; vestiture blue black, somewhat roughened. Palpi nearly one-half as long as proboscis, uniform, black with a bronzy reflection, a few outstanding setæ. Antennæ slender, basal joints about four times as long as wide, terminal ones increasingly longer, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, brownish luteous, a patch of brown scales within; hairs of whorls rather sparse, long, black. Clypeus broad, rounded, blackish brown, nude, with dense pale pruinosity. Eyes black, contiguous at vertex. Occiput smoothly clothed with flat appressed scales, black with metallic blue and silvery reflection, a row of erect, forked black scales along posterior margin; a row of setæ along margin of eyes, two coarse bristles at vertex.

Prothoracic lobes large, elliptical, remote dorsally, luteous, clothed above with dull-brown scales with blue and green metallic reflection, below with silvery scales, a row of setæ along anterior margin. Mesonotum brown, densely clothed with small lanceolate scales, grayish brown with a submetallic bronzy reflection, a row of bristles around edges of disk and ante-scutellar area, and a dense area of ferruginous ones at roots of wings. Scutellum trilobate, vestiture of broad, flat brown scales with dull blue and green reflection, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, with two oblique grooves converging posteriorly and a small tuft of setæ posteriorly. Pleuræ dark brown in middle, coxæ luteous, clothed with patches of silvery-white scales extending under anterior margin of mesonotum.

Abdomen subcylindrical, slightly flattened apically, blunt at tip, with terminal bristles; dorsal vestiture black with a blue and green metallic reflection; venter yellowish silvery, colors separated on sides in an undulating line.

Digitized by Google

Wings narrow, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell much shorter than its cell; basal cross-vein slightly before anterior cross-vein; scales of veins elliptical, brown, with a bronzy reflection, denser and overlapping on apical third of wing. Halteres black, except at base.

Legs long, slender, black with violet and blue reflection, femora whitish beneath; spines on hind tibiæ large; front and mid legs without white markings; hind legs with a white spot at apex of femora beneath, a white spot on under sides of tibiæ beyond middle, tarsi with basal white dashes on under side, becoming progressively longer on each segment and reaching nearly to apex of fifth. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Life history and habits unknown.

Interior of Nicaragua.

Genus JOBLOTIA Blanchard.

Trichoprosopon Theobald (not *Trichoprosopus* Macquart), Journ. Trop. Med., iv, 235, 1901 (without species).
Trichoprosopon Theobald (not *Trichoprosopus* Macquart), Mon. Culic., ii, 283, 1901.
Joblotia Blanchard, C. R. Soc. de Biol., liii, 1046, 1901.
Trichoprosopon Giles (not *Trichoprosopus* Macquart), Gnats or Mosq., 2 ed., 367, 1902.
Joblotia Neveu-Lemaire, C. R. Soc. Biol. Paris, liv, 1331, 1902.
Joblotia Neveu-Lemaire, Mém. Soc. Zool. Fr., xv, 218, 1902.
Joblotia Theobald, Mon. Culic., iii, 334, 1903.
Trichoprosopon Lutz (not *Trichoprosopus* Macquart), in Bourroul, Mosq. do Brasil, 55, 1904.
Joblotia Blanchard, Les Moustiques, 428, 1905.
Joblotia Theobald (in part), Gen. Ins., Culic., 33, 1905.
Joblotia Dyar, Proc. Ent. Soc. Wash., vii, 47, 1905.
Trichoprosopon Coquillett (not *Trichoprosopus* Macquart), U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 26, 1906.
Joblotia Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 225, 1906.
Joblotia Dyar & Knab, Can. Ent., xxxix, 49, 1907.
Trichoprosopon Theobald (not *Trichoprosopus* Macquart), Mon. Culic., iv, 590, 1907.
Joblotia Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 248, 1907.
Joblotia Williston, Man. No. Amer. Dipt., 3d ed., 108, 1908.
Trichoprosopon Peryassú (not *Trichoprosopus* Macquart), Os Culic. do Brazil, 37, 1908.
Joblotia Pazos (in part), San. y Ben., ii, 42, 44, 1909.
Trichoprosopon Theobald (in part, not *Trichoprosopus* Macquart), Mon. Culic., v, 556, 1910.

The type species are: of *Trichoprosopon* Theobald, *Trichoprosopon nivipes* Theobald, and of *Joblotia* Blanchard, *Trichoprosopon nivipes* Theobald.

Generic Diagnosis of Adult:

Proboscis rather long and slender, hardly swollen at the tip. Palpi short in the female, nearly as long as the proboscis in the male, very slender. Antennæ with the joints subequal in the female, the last two joints long in the male, each joint in the male and the female with a minute secondary subapical whorl, in the male the median joints shortened and thickened at the insertions of the primary whorl. Clypeus with coarse or fine hairs. Vestiture of flat, appressed scales, the head with a collar-like row of erect, forked scales at the nape, the mesonotum without setæ on the disk. Eyes dorsally contiguous. A pair of coarse bristles projecting forward at vertex. Prothoracic lobes moderate, well separated dorsally. Abdomen subcylindrical, blunt at the tip. Legs long and slender, ciliate in some species; claws small, equal and simple in the female; in the male unequal on the front and mid legs, the larger claw sometimes with a tooth.

Generic Diagnosis of Larva:

Mandibles large, visible from above in some species; air-tube without pecten, with a hair-tuft near the base; no lateral comb on the eighth segment, a large tubercle only; anal segment with dorsal plate and a pair of subventral tufts, united by a curved chitinous band; anal gills well-developed.

Digitized by Google

Forested regions of tropical America, exclusive of the greater Antilles.

The larvæ inhabit water collected in dead parts of plants or in bases of leaves, etc., when rich in decomposing organic matter. They seem especially partial to cocoanut-shells which contain the decomposing remains of the meat of the nut as well as portions of dead insects. They occur in artificial receptacles, such as tin cans, when the contained water is foul enough. The larvæ soon die if transferred to clear water. They always occur together in some numbers. The eggs are laid either singly, and are then furnished with ridges that act as floats, or in boat-shaped masses, according to the species. The larvæ develop fairly rapidly when the food is abundant, otherwise with considerable slowness, and if food is very scant, they can live for a long period. The adults are diurnal; the flight is slow, with the legs extended; they approach man, but seldom attempt to bite. We find no records of their having been observed to bite, but it is possible that they do so.

The most important character diagnostic of this genus is the presence of setæ on the clypeus. These are coarse and distinct in some species, but small and weak in others. Their distribution upon the clypeus is likewise variable in the different species.

The genus was first characterized by Theobald under the name *Trichoprosopon;* but this is too similar to *Trichoprosopus* Macquart, differing only in termination, and we have preferred to adopt Blanchard's substitute, *Joblotia.* Lutz and others have attempted to use both names for different generic assemblages, which is not justified (see remarks under *Lesticocampa*).

TABLES OF THE SPECIES.

ADULTS, STRUCTURE AND COLORATION.

1. Hind legs with fourth and fifth tarsal joints white.. *digitatus* Rondani (p. 176)
   Hind legs with part of third joint also white..... 2
2. Clypeus with a fringe of small hairs mixed with a few scales
   mogilasia Dyar & Knab (p. 181)
   Clypeus with a row of fine hairs along each side, none in front
   trichorryes Dyar & Knab (p. 183)

ADULTS, MALE GENITALIA.

(See the table of *Lesticocampa*, page 163.)

LARVÆ

1. Mandibles concealed, invisible from above..... *digitatus* Rondani (p. 179)
   Mandibles projecting, visible from above..... 2
2. Eighth segment with a large tuft near tube... *trichorryes* Dyar & Knab (p. 184)
   Eighth segment with a single hair in this position
   mogilasia Dyar & Knab (p. 183)

JOBLOTIA DIGITATUS (Rondani) Dyar & Knab.

Culex digitatus Rondani, Baudi e Truqui, Studi Entomol., 109, 1848.
Trichoprosopon nivipes Theobald, Mon. Culic., ii, 285, 1901.
Trichoprosopon nivipes Giles, Gnats or Mosq., 2 ed., 367, 1902.
Joblotia nivipes Theobald, Mon. Culic., iii, 334, 1903.
Trichoprosopon nivipes Lutz, in Bourroul, Mosq. do Brasil, 68, 1904.
Joblotia nivipes Blanchard, Les Moustiques, 429, 1905.
Ioblotia (Trichoprosopon) nivipes Goeldi, Os Mosq. no Pará, 120, 1905.
Joblotia nivipes Theobald, Ann. Mus. Nat. Hung., iii, 109, 1905.
Joblotia nivipes Theobald, Gen. Ins., Culic., 33, 1905.
Joblotia niveipes Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 225, 1906.
Trichoprosopon nivipes Dyar, Proc. Ent. Soc. Wash., viii, 20, 1906.
Trichoprosopon nivipes Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 27, 1906.
Trichoprosopon nivipes Theobald, Mon. Culic., iv, 593, 1907.
Joblotia digitatus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 206, 207, 1907.
Joblotia digitatus Busck, Smiths. Misc. Colls., quart. iss., iii, 76, 1908.
Trichoprosopon nivipes Peryassú, Os Culic. do Brasil, 53, 271, 1908.
Trichoprosopon nivipes Theobald, Mon. Culic., v, 557, 1910.

Digitized by Google

ORIGINAL DESCRIPTION OF CULEX DIGITATUS:

Long. mill. 4.

♀ Nigricans: palpis, proboscide, facie, articulo primo antennarum nigris.—*Thorax* dorso parum chalybeo-pollinoso; humeris subcupreis: pleuris albidi et nivei sed non ubique tomentosis.—*Scutellum* colore thoracis polline fusco-subvirescente et chalybeo parum adsperso, et limbo exili lutescente.—*Metathorax* in medio niger lateribus et origine alarum lutescentibus.—*Halteres* fusci basi lutea.—*Abdomen* dorso nigricante ut thorax parum pollinoso, polline fusco-subvirescente et chalybeo: ventre albo-pollinoso.—*Pedes* in latere anteriori nigricante sub-chalybei, in facie posteriori femoribus sub-argenteis, tibiis pallide sub-aeneis, tarsis sub-cupreis; tarsi intermedii articulis quatuor ultimis extrinsecus tantum albido-sub-argenteis; pedes postici longissimi, tarsis articulis duobus extremis omnino albo-sub-argenteis.

ORIGINAL DESCRIPTION OF TRICHOPROSOPON NIVIPES:

Thorax dark brown, pleurae and front of the mesothorax at the sides bright ochraceous, with a distinct silver spot on the middle of the pleurae. Abdomen deep metallic purple above, golden-yellow below, with lateral triangular golden spots. Legs deep brownish-black, with purple and blue metallic reflections, the four tarsi of the middle legs and last two of the hind legs pure white in both sexes. Ungues of the ♀ small, equal and simple; in the ♂ the fore and mid ungues unequal, simple, and in the hind legs equal and simple.

♀. Head completely covered with bright ochraceous flat scales with metallic mauve reflections, sometimes entirely mauve; those at the side and just round the eyes show silvery-white reflections in some lights; projecting over the eyes are short dark-brown bristles; eyes deep purplish black, green and blue; antennæ brown, with pale rings, and a double set of verticillate hairs, the large ones arising from just above the paler bands, the smaller from just below; hairs dark brown; basal joints rather brighter brown on one side, with numerous curved brown hairs; clypeus brown, densely covered with black bristles; palpi covered with blackish scales with dull purple reflections, moderately long proboscis, covered with brown scales, somewhat ochraceous in the middle and darker at the apex.

Thorax brown, the mesonotum covered with bronzy spindle-shaped scales; sides of the mesonotum ochraceous; prothoracic lobes deep ochraceous, with flattened scales, which show mauve tints, and brown bristles; scutellum chestnut-brown, covered with dark flat scales, showing peacock-blue and green reflections; metanotum deep brown and chestnut-brown, with two median rows of flat blue scales and a dense tuft of bristles arranged in two lateral lines; pleurae ochraceous, with numerous patches of small flat dull white scales and a somewhat darker patch in the middle.

Abdomen steely in places, the apical segment bright testaceous; covered with deep purplish-brown scales showing brilliant purple and mauve reflections; apex densely bristly; laterally are creamy-white to yellow scales, forming more or less triangular patches, the bases of the triangles being on the apical borders of the segments; venter ochraceous, with creamy-yellow and pale-creamy scales.

Legs brown, covered with deep brown scales, which show brilliant purple and blue reflections, and in places a dull ochraceous tint; on the apices of the joints and along the tibiae are short black spines; mid legs with all four tarsi white above; hind legs densely scaly, the last two tarsi pure white; tibiæ slightly pale at the base; hind metatarsi as long as the tibiæ; ungues small, equal and simple.

Wings dusky, the veins very densely covered with rather broad scales, like *Taeniorhynchus;* fork-cells long, the first sub-marginal considerably longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the latter; stem of the first sub-marginal rather short, considerably less than half the length of the cell; stem of the second posterior more than half the length of the cell; mid cross-vein a little nearer the apex of the wing than the supernumerary cross-vein; posterior cross-vein on a line with the mid; the sub-costal joins the costal a little past the level of the cross-veins; the second longitudinal vein carried nearly to the base of the wing; the anal cell is very large.

Halteres with an orchaceous stem and fuscous knob, and numerous black scales on it, which pass down the stem.

Length.—7 to 8 mm.

♂. Very similar to the ♀; antennæ banded brown and white, with two rows of verticillate hairs, the larger dense, long, and brown; the penultimate joint densely hairy; basal joint testaceous yellow; palpi long and thin, deep bronzy-brown, 4-jointed, the joints of nearly equal length, the apex with four thick spines, and the penultimate joint with a few black lateral spines.

Abdomen peacock-blue at the base, remainder purple; basal joint scaly, brown.

Digitized by Google

Fore legs all deep metallic purple, with bronzy reflections; mid legs with the four tarsi pure white, the last showing dark reflections; hind legs with the last two tarsi only white; fore and mid ungues black, unequal, simple, the fore nearly straight, the mid rather more curved, the hind very small, equal and simple.

Wings with the cross-veins as in the ♀, the brown scales showing a deep violet tint in the light.

Length.—7.5 mm.

Habitat.—Trinidad (Urich).

Time of capture.—December.

Observations.—Described from several ♀'s and a single ♂. It is a very beautiful mosquito, quite unlike any I have seen, and certainly forms a new genus. The only variable characters seem to be in the last tarsal joint of the mid legs, which in some specimens is white, in others grey, and in others almost brown. The majority have the head scales showing brilliant mauve reflections, but in one they are mainly dull ochraceous.

Mr. Urich states in his letter that he has found the breeding-place of this handsome species, but gives no details.

They were taken at Aqua Santa, on a "Cocoa Estate" bordering on a forest. They are found in the cocoa groves, but do not come into the houses.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF JOBLOTIA DIGITATUS:

Female.—Proboscis moderate, rather long, uniform, labellæ conically tapered; vestiture blue black, setæ rather distinct, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, stout, blue black, with a group of projecting setæ below. Antennæ with the joints subequal, the basal ones shorter, rugose, pilose, black, second joint luteous at the base; tori subspherical, with a cup-shaped apical excavation, dark luteous, brown within; hairs of whorls long, rather dense. Clypeus flat, rounded, dark brown, with a dense fringe of coarse hairs around margin and covering outer third of upper surface. Eyes black. Occiput densely clothed with flat black scales with a bright blue or silvery reflection, a row of setæ along margins of eyes, the lateral and vertical ones longer, a row of short, erect, forked black scales on the nape posteriorly.

Prothoracic lobes elliptical, remote dorsally, densely clothed with shining silvery scales and a few black bristles. Mesonotum pale brown, darker in the middle, clothed with rather broad, curved brownish-black scales, the anterior angles clothed with broad, flat iridescent-violet scales, setæ along sides and at roots of wings dense, black, short. Scutellum trilobate, clothed with broad, flat black scales with a blue luster, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, with a groove each side of the middle, the grooves converging posteriorly, where there is a group of short black setæ preceded by a double elongate patch of small, flat iridescent scales. Pleuræ and coxæ luteous, clothed with small elliptical, flat silvery scales and tufts of brown bristles.

Abdomen subcylindrical, truncate at tip, dorsal vestiture black with green and blue reflection, venter golden, with a white reflection, colors separated on sides in an undulating line. First abdominal segment clothed above with flat black scales, with a green reflection, and many fine pale hairs.

Wings narrow, hyaline, iridescent; petiole of second marginal cell one-third as long as its cell, that of second posterior shorter than its cell; cross-veins incident; scales of veins brown, with a blue reflection on costa, large, dense, overlapping, broadly elliptical, some of them obliquely subtruncate. Halteres black, except at the base.

Legs long and slender, the scales, especially of the posterior tibiæ, rough and somewhat outstanding, black, with a strong violet and blue reflection; posterior tibiæ and first tarsal joint white at base; mid legs with the four terminal tarsal joints white, the last one with blackish tip; hind legs with the last two tarsal joints white and a very little white at tip of third joint. Claw formula, 0.0–0.0–0.0.

Digitized by Google

Length: Body about 6 mm.; wings 5 mm.

Male.—Palpi nearly as long as proboscis, slender, uniform, with a few outstanding setæ towards the tip. Antennæ with the two last joints long and slender, rugose, pilose, black; the others short, yet over twice as long as wide, whitish, with narrow, irregular black rings at insertions of hair-whorls; hairs long, dense plumose, black. Coloration as in the female. Wings hardly narrower than in the female, the stems of the fork-cells longer, basal cross-vein beyond the anterior, vestiture somewhat less abundant. Claws simple, large and unequal on the front and middle legs, small and nearly equal on the hind ones; formula, –0.0–0.0–0.0.

Length: Body about 6.5 mm.; wings 5 mm.

Genitalia (plate 7, fig. 42): Side-pieces conical, over twice as long as broad, simple, without projections. Clasp-filament long and slender, with an inserted terminal spine; a rounded lobe at extreme base of side-piece within, bearing a number of long setæ. Harpes flat, tapering to tip, inner margin revolute, apex concave, with a row of short teeth. Harpagones absent. Unci forming a low, broad triangular plate. Basal appendages represented by a transverse row of stout setæ.

Larva, Stage IV (see figure of the entire larva, plate 47).—Head subquadrate, side angles roundedly prominent, forming a right angle between posterior edge of occiput and lateral margin behind the antennæ; a flattening at base of antennæ; front margin feebly arcuate. Antennæ small, cylindrical, uniform, smooth, the terminal digits stout and equal in length, a single hair beyond middle. Eye small, round. Head-hairs all single. Mental plate triangular, a terminal tooth and seven on each side, the basal ones more pointed and more remotely placed. Mandible quadrangular, outer margin oblique, dentition terminal; a filament before tip arising from a rounded notch; a short, curved outer row of cilia; dentition of five large teeth, the second longest; a cordate tooth below in a sinus, the upper edge of which is vertical, with a tuft of small hairs; no hairs below. Maxilla short, irregular, without visible suture; inner half with a subapical thorn-shaped prominence; a central row of hairs; paired filaments terminal; a tuft of hair on the angle next the palpus. Palpus long, nearly reaching tip of maxilla, with four short apical digits. Thorax quadrangular, rounded at corners, wider than long; hairs moderately long, less tufted on mesothorax. Abdomen moderate, elongate, the segments subequal, moniliform; hairs very long, lateral ones double on first three segments, single on third to sixth, diminishing somewhat posteriorly; short hairs well developed, single. Tracheal tubes moderately broad, band-shaped, flexuous, uniform. Air-tube stout, slightly tapered, twice as long as wide, without pecten; a single large hair tuft before the middle. Eighth segment with a stout seta from a large tubercle; no comb. Anal segment as long as wide, expanded outwardly, dorsal plate three-fourths inclosing segment; dorsal tufts of four long hairs; a single long lateral hair at angle of plate; subventral tuft of two long hairs, connected by a curved chitinous band with its fellow on the other side. Anal gills large, broad, twice as long as the segment, with central branched tracheæ.

The eggs are laid in rafts, according to the observations of Mr. Jennings, who preserved a female which he had observed in the act of oviposition. Mr. Knab collected the larvæ in numbers in some cocoanut-husks at Izalco, Salvador, in 1905. These husks contained only the larvæ of *Joblotia digitatus*, with an occasional *Megarhinus moctezuma* preying upon them. In these locations he found several egg-boats, the larvæ from which were not bred. About 100 eggs in each circular raft, standing upright, of a light gray color, the raft flat, not curved at the sides. Single egg cylindrical, nearly alike at the two ends, which

Digitized by Google

taper to a small rounded point; integument smooth. The eggs hatched by a slit on one side, nearly half the length of the egg, no lid being detached.

The larvæ live in water rich in decomposing organic matter or the remains of insects, such as collect in dead plant-tissues or occasionally at bases of living leaves or in artificial receptacles. They develop fairly rapidly under suitable conditions of temperature and food, but may live a long time when the food-supply is insufficient. The water in old cocoanuts and cacao-husks becomes often as thick as syrup from the decomposing pulp of the fruit, and so black as to be opaque. In these conditions the *Joblotia* larvæ flourish, to the exclusion of other mosquito larvæ. Dead insects which have fallen into the water furnish additional food. We quote the following from Mr. Knab's notes:

"The larvæ are opaque, cream-white; head ferruginous yellow; tube and anal plate brown; tracheæ narrow, but slightly dilated, gray; stomach cæcæ small; digestive tract brown; anal segment greatly dilated towards the orifice, with four large, rather long tracheal gills which are almost continually vibrated. When at the surface the larvæ hang perpendicularly. They feed upon dead insects that have fallen into the water; the bodies of some dead larvæ were eaten into by them. The water contained dead ants, staphylinids, flies, etc. The pupa is pitchy brown, the segmental incisures dirty white; pale brownish beneath. Air-tubes dull orange, rather short, very broad at tip. Abdomen long and pendant when the pupa is at the surface. Paddles very short, dull yellow; last two segments with lateral ample fan-tufts of hairs. The pupa can remain at the bottom for some time without moving and without any hold, even in a smooth bottle."

At Sonsonate, Salvador, Mr. Knab found the larvæ in cocoanut-husks, associated with *Limatus cacophrades, Hæmagogus albomaculatus, Wyeomyia aporonoma, Wyeomyia hemisagnosta,* and *Megarhinus moctezuma.*

Mr. Busck says:

"The fat short-tubed larvæ were to be found in any bamboo-joint which contained the thick, saturated, often ill-smelling fermenting fluid, to which they seem partial. They were bred in Trinidad from cacao-husks, in which the fluid was as thick as gruel.

"Transferred to water, which is less rich in food, these larvæ remain alive unchanged for long periods. Some of my Trinidad larvæ lived for four months after reaching Washington, and some of the Panama material did nearly as well. The normal development, under natural conditions, with abundant food, takes about two weeks."

Dr. Goeldi says:

"It is a forest mosquito. The imagos bred by us in captivity never would accept blood. Fed with honey and water, they lived, in four cases of which I took notes, from five to nine days. Neither of the females captured at large would lay eggs in captivity, nor would the females reared from larvæ."

Forested regions of tropical America, southern Mexico to Brazil.

Santa Lucrecia, State of Vera Cruz, Mexico, adult captured, June 21, 1905 (F. Knab); Sonsonate, Salvador, larvæ in cocoanut-husks and cacao-shells, August 19 to 30, 1905 (F. Knab); Izalco, Salvador, larvæ in cocoanut-husks, August 21 to 31, 1905 (F. Knab); Port Limon, Costa Rica, larvæ in an old kerosene-tin, half filled with dirt and rubbish, and in a cocoanut-husk, with thick, slimy water, September 30, 1905 (F. Knab); Tabernilla, Canal Zone, Panama, larvæ in bamboo, May 21, June 15, July 18, 1907 (A. Busck); Gatun, Canal Zone, Panama (A. H. Jennings); Montserrat, Trinidad, British West Indies, larvæ in old half cacao-shells in cacao woods, very dirty black water, June 20, 1905 (A. Busck); Upper Pequini River, Panama, March 30, 1909,

Digitized by Google

larvæ in a palm-spathe on the ground (A. H. Jennings). The species is also reported from São Paulo, Brazil (Lutz); City of Rio de Janeiro (Peryassú); City of Pará (Goeldi); Oyapoc, in the State of Pará (Ducke); Teffé, State of Amazonas (Peryassú); Manáos, State of Amazonas (Theobald); Pernambuco (Peryassú); on the margins of the rivers Xerém and Mantiquira, State of Rio de Janeiro (Peryassú); Juiz de Fóra, Oliveira, Lavras, Descalvado, and Ouro Fino, State of Minas Geraes (Peryassú), Brazil.

Dr. Lutz says (Centralblatt f. Bakter. Parasit. u. Infektionskr., Abt. i, xxxiii, 289, 1903) that the eggs are laid singly whereas those observed by Mr. Knab, Mr. Jennings and Mr. Urich, and which certainly belong to this species, were deposited in rafts. We believe that Dr. Lutz's observations were really based upon another species. The very similar *Joblotia trichorryes* lays its eggs singly. Dr. Goeldi has figured as the young larva that of *Limatus durhamii,* and this figure has been copied by Theobald, instead of the larger figure which correctly represents the species (Os Mosq. no Pará, pl. L, fig. 104 is *L. durhamii,* fig. 105 is *J. digitatus*). Dr. Goeldi further apparently says that the larvæ inhabit water held by bromeliads and banana-leaves and even rain-puddles. We do not think this can be a fact, for such locations are not rich enough in food to support the larvæ, which in our experience, live only in foul water, while that in the bromeliads is fairly clean. On carefully reading Dr. Goeldi's remarks, however, it appears that he instructed his assistants to bring him water "contained between the leaves of bromelias, at the bases of the leaves of banana-plants, from hollows in fallen trees, etc., and also in small puddles of rain-water, which had been formed spontaneously, without the intervention of man." This water was brought to him in glass jars, and contained *Joblotia* larvæ. We infer that the water was mixed, and that the *Joblotia* larvæ came from locations similar to those in which we have met with them. Dr. Lutz says that they are generally bromelia feeders, but we do not know whether he is correctly quoted, or whether his statement is based on observation or inference; perhaps they refer to another species. Both Knab and Busck found the larvæ almost invariably in foul water in cacao-husks and in cocoanut-shells. It seems probable that the larvæ have been addicted to cacao-husks from the earliest times. Wild cacao occurs in the moist forests of tropical America, and the fallen fruits, broken and emptied by monkeys or other animals, must have furnished suitable breeding-places for this species long before the advent of man.

Culex digitatus was considered identical by Blanchard (Les Moustiques, 319, 1905) with a species of *Psorophora* (subgenus *Janthinosoma*) from Guiana which Neveu-Lemaire had wrongly identified with the African *Culex albitarsis* Theobald; Theobald accepts Blanchard's identification (Mon. Culic., v, 390, 1910). Neither author could have carefully read the original description of *Culex digitatus* which agrees in every respect with the species now before us. Dyar and Knab have described Neveu-Lemaire's species as *Janthinosoma vanhalli* (Proc. Biol. Soc. Wash., xix, 134, 1906), which will now become *Psorophora vanhalli.*

JOBLOTIA MOGILASIA Dyar & Knab.

Joblotia mogilasia Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 206, 1907.
Joblotia mogilasia Busck, Smiths. Misc. Colls., quart. iss., lii, 77, 1908.
Joblotia (?) *mogilasia* Theobald, Mon. Culic., v, 621, 1910.

ORIGINAL DESCRIPTION OF JOBLOTIA MOGILASIA:

♀.—Form stouter than the preceding species; proboscis shorter than the body, gradually enlarged towards the apex. Clypeus brown, prominent, with a fringe of small hairs mixed with a few scale-like hairs at the sides, nude on the upper surface. Palpi short and slender, about one fourth the length of the proboscis.

Digitized by Google

Occiput clothed with flattened dusky scales with an obscure metallic blue and green luster; prothoracic lobes large and prominent, well separated and clothed with silvery scales, mesonotum dusky scaled, with an obscure bluish luster; pleura ochreous yellow, covered with silvery scales; scutellum covered with large, flat, broad, metallic blue-green scales; metanotum dusky brown with two longitudinal impressions and a group of coarse bristles near the apex; abdomen dusky above with metallic blue and green reflections, truncate at the tip, beneath yellowish white with an undulate margin at the sides; wings long and narrow, the scales of the veins dusky; legs long, moderately slender, without distinct raised scales, dark, with blue and violet luster, the hind tibiæ are white marked at the base; the last four joints of the middle tarsi are bright white, extreme tip black, on the hind tarsi the apical half of the third and the fourth and fifth joints white. Length, 6 mm.

Three specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in bamboo joints. The larva resembles that of *Joblotia digitatus* Rondani (= *nivipes* Theobald).

***Type*.—No. 10848, U. S. National Museum.**

Description of Female and Larva of Joblotia mogilasia (Male Unknown):

Female.—Proboscis rather long, uniform, labellæ conically tapered; vestiture greenish black, setæ rather distinct, curved black, those on labellæ more prominently outstanding. Palpi one-fourth as long as proboscis, stout, greenish black, with a group of projecting setæ below. Antennæ slender, with joints subequal; basal ones shorter, rugose, pilose, black, second joint luteous at base; tori subspherical, with a cup-shaped apical excavation, luteous, dark brown within; hairs of whorls long, rather dense. Clypeus flat, rounded, subtruncate, dark brown, pale in middle, with a fringe of fine hairs around front margin, some coarser hairs and a few scales at sides. Eyes black. Occiput densely clothed with flat gray scales with a blue reflection, silvery in some lights, dull brown in others, a row of short, erect, forked black scales on the nape; a pair of coarse bristles at vertex, a row of setæ along margins of eyes, the lateral ones longer.

Prothoracic lobes elliptical, remote dorsally, densely clothed with shining silvery scales and a few black bristles. Mesonotum pale brown, darker in the middle, clothed with rather broad, curved brownish-black scales; setæ along sides and at roots of wings dense, brown, short. Scutellum trilobate, clothed with broad, flat metallic-blue scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, with a groove each side of middle, the grooves converging posteriorly where there is a group of short black setæ, preceded by double elongate patch of small, flat iridescent scales. Pleuræ and coxæ luteous, pleura with a brown spot, clothed with small, elliptical, flat silvery scales and tufts of brown bristles.

Abdomen subcylindrical, truncate at tip, dorsal vestiture black with green and blue reflection, venter pale golden with a white reflection, colors separated on sides in an undulating line; tip with numerous stiff brown bristles.

Wings narrow, hyaline, iridescent; petiole of second marginal cell one-third as long as its cell, that of second posterior shorter than its cell; basal cross-veins more than its own length beyond anterior cross-vein; scales of veins brown, with a blue reflection on costa, dense, overlapping, broadly elliptical. Halteres black, except at base.

Legs long and slender, the scales somewhat roughened, forming a small fringe on apical half of hind tibia and base of first tarsal joint, black with a strong violet-blue reflection; posterior tibiæ white at the base; mid legs with the four terminal tarsal joints white, the last one sometimes blackish at tip; hind legs with last two and outer third of the third tarsal joints white. Claw formula, 0.0–0.0–0.0.

Length: Body about 7 mm.; wings 5.5 mm.

Larva, Stage IV (plate 93, fig. 302).—Head rounded-triangular in outline, the neck small; labrum broadly triangular, fringed by the mouth-brushes; mandibles strongly prominent; antennæ small, slender, less prominent than

Digitized by Google

mandibles, with a small hair near the tip; head-hairs all single. Lateral abdominal hairs in threes on first segment, double on second to fifth, single on sixth and seventh. No lateral comb on eighth segment, a small round plate bearing a single stout seta, behind which is a small slender seta. Air-tube subconical, about two and a half times as long as wide, smooth, a large, coarse, multiple tuft posteriorly at basal third; terminal hooks small. Anal segment twice as long as wide, with a large dorsal plate; dorsal tuft of two long hairs on each side; lateral hair single; subventral tuft of two long hairs arising from angle of a small curved plate which extends across the ventral line to the tuft of the other side. Anal gills longer than the segment, stout, with rounded tips, equal.

The larvæ inhabit similar situations to those of the *Joblotia digitatus*. Mr. Busck says:

"Bred from bamboo near Tabernilla. While the larva and adult in a general way look much like the two other species, the pupa of this species is easily distinguished from the somber, dark pupa of the others; it is bright yellow, prettily marked with black cross-bands on the back of the abdominal segments."

Panama.

Tabernilla, Canal Zone, larvæ in bamboo-joints, May 9, 1907 (A. Busck).

JOBLOTIA TRICHORRYES Dyar & Knab.

Joblotia trichorryes Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 206, 1907.
Joblotia trichorryes Busck, Smiths. Misc. Colls., quart. iss., iii, 76, 1908.
Joblotia (?) *trichorryes* Theobald, Mon. Culic., v, 620, 1910.

ORIGINAL DESCRIPTION OF JOBLOTIA TRICHORRYES:

♀.—Form elongate-slender, the abdomen compressed; proboscis shorter than the body, rather stout, and slightly enlarged towards the apex. Clypeus prominent, luteous brown, with a row of fine hairs along each side, none in front nor on the upper surface. Palpi short, rather slender, about one fourth the length of the proboscis; tori yellow-brown; antennæ with whorls of long hairs; occiput clothed with flat iridescent blue and green scales, brilliant silvery in some lights; hind margin with a row of erect dark scales; prothoracic lobes large and prominent, well separated, clothed with brilliant silvery scales; mesothorax somewhat compressed, clothed with dusky scales, pleura ochreous yellow, with patches of silvery scales; scutellum clothed with broad flat metallic blue-green scales; metanotum with three longitudinal impressions, a group of coarse terminal hairs; abdomen obliquely truncate at the tip, clothed above with dusky scales, which show metallic-green and steel-blue reflections; beneath silvery white, encroaching on the lateral area as rounded segmentary incisions. Wings long and narrow, hyaline, the scales of the veins dusky. Legs long, slender, without raised scales, black, with metallic violet and blue reflections, the tarsi of the middle legs with the last four joints brilliant white, the hind legs with the outer half of the third and the last two joints white. Claws simple. Length, 5.5 mm.

♂.—Proboscis shorter than in the female, more distinctly swollen at the tip; palpi long, nearly as long as the proboscis, very slender; antennæ rather sparsely plumose; abdomen much compressed; claspers stout, rather small; no lateral fringe. Length, 5.5 mm.

Thirty-six specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in bamboo joints. The larva resembles that of *Joblotia digitatus* Rondani, but has the mandibles long and slender. In some of the adults there is a little of black on the last joint of the middle legs.

Type.—No. 10847, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF JOBLOTIA TRICHORRYES:

Female.—Proboscis rather long, slightly enlarged apically, the labellæ conically tapered; vestiture blue black, setæ rather distinct, curved, black, those on the labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, stout, blue black, with a group of projecting setæ below. Antennæ slender, with the joints subequal, the basal ones shorter, rugose, coarsely pilose, black, second joint luteous at base; tori subspherical, with a cup-shaped apical excavation, luteous, dark brown within; hairs of whorls long, rather dense. Clypeus flat, broad, rounded, dark brown, with a slight fringe of coarse hairs on

Digitized by Google

the sides, nearly absent in front, but finely pubescent. Eyes black. Occiput densely clothed with flat gray scales with a bright blue reflection, silvery in some lights, a row of short, erect, forked black scales on posterior margin; two coarse bristles at vertex, a row of setæ along margins of eyes, the lateral ones longer.

Prothoracic lobes elliptical, remote dorsally, densely clothed with shining silvery scales and a few black bristles. Mesonotum pale brown, darker in the middle, clothed with rather broad, curved bronzy-black scales, setæ along sides and at roots of wings dense, black, short. Scutellum trilobate, clothed with broad, flat, metallic greenish blue scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, with a groove each side of the middle, the grooves converging posteriorly, where there is a group of coarse black setæ preceded by a double elongate patch of small, flat iridescent scales. Pleuræ and coxæ luteous, clothed with small, elliptical, flat silvery scales and tufts of brown bristles.

Abdomen subcylindrical, truncate at tip, the dorsal vestiture black, with green and blue reflection, venter golden, with a white reflection, colors separated on sides in an undulating line; tip with many stiff bristles.

Wings narrow, hyaline, iridescent; petiole of second marginal cell one-third as long as its cell, that of second posterior shorter than its cell; basal cross-vein about its own length beyond anterior cross-vein; scales of veins brown, with a blue reflection on costa, dense, overlapping, broadly elliptical, many obliquely subtruncate. Halteres black, except at base.

Legs long and slender, black, with a strong violet and blue reflection; femora white beneath, except at tip; posterior tibiæ white beneath at the base; mid legs with the four terminal tarsal joints white, the last one with blackish tip; hind legs with the last two and the apical half of the third tarsal joints white. Claw formula, 0.0–0.0–0.0.

Length: Body about 6 mm.; wing 4.5 mm.

Male.—Palpi four-fifths as long as proboscis, slender, uniform, with a few outstanding setæ towards tips of joints. Antennæ long and slender, with last two joints long and slender, rugose, pilose, black, the others shorter, yet about five times as long as wide, black, with narrow, irregular white rings below insertions of hair-whorls; hairs long, rather dense, scarcely plumose, black. Coloration as in the female, terminal segment of abdomen metallic-blue scaled above. Wings slightly narrower than in the female, the stems of the fork-cells longer. Claws of the fore and mid tarsi large, unequal, strongly curved, one fore claw with a large tooth. Claw formula, 1.0–0.0–0.0.

Length: Body about 5.5 mm.; wings 4 mm.

Genitalia (plate 6, fig. 41): Side-pieces about twice as long as wide, the tips conically tapered; basal lobes large, rounded, setose. Clasp-filaments long and slender, with an articulated terminal claw. Harpes prominent, with thickened inner margin and curved spinose tip. Harpagones rather prominently exserted, forming a basal cone. Basal appendages longer than wide, with a row of coarse, long terminal setæ.

Larva, Stage IV (plate 93, fig. 300).—Head rounded, somewhat pointed before, the labrum triangular, truncate; mandibles strongly projecting; antennæ moderate, slender, less prominent than mandibles, with a single small hair near tip; head-hairs all single. No lateral comb on eighth segment, a rounded chitinous plate bearing a single stout seta; a large multiple tuft behind it. Air-tube subfusiform, widened at basal third, smooth, with a large tuft posteriorly, about two and a half times as long as wide; terminal hooks small. Anal segment longer than wide, with a large dorsal plate, spinosely roughened on its

Digitized by Google

posterior border; dorsal tuft of two long hairs on each side; lateral hair single, long, arising from an angle in the plate; subventral tuft of two long hairs arising from the corner of a small ventral plate that runs across to the tuft on the other side. Anal gills twice as long as the segment, stout, with rounded tips, the upper pair very slightly weaker than the lower pair.

The larvæ live in similar locations to those of *Joblotia digitatus*. The eggs are laid singly. We abstract from Mr. Busck's remarks:

"Bred commonly together with *J. digitatus*. The eggs are laid singly on the surface of the water. They are elliptical, black, with four longitudinal fringes of short white hairs from tip to tip. The larva issued from one end. In a bamboo-joint, which I prepared and filled with water at 5 o'clock on the evening of May 1, I found the next morning at 9 o'clock some twenty such eggs, kept floating on the surface by the hair fringes. Some of these eggs were submerged during transit, and with the fringes once wet remained under water. They hatched, nevertheless, together with the non-submerged eggs, during the afternoon of the same day. The young larvæ were white, with black hairs. They remained under water for several hours, eating of the vegetable matter at the bottom. The next morning they had doubled in size, and on the third day attained their full size. They came regularly, though not very frequently, to the surface to breathe. When feeding on the bottom they would lie in the soft residue of vegetable matter in different positions. The first adult issued May 14. The adults of this and the other species of *Joblotia* are conspicuous objects in the bamboo woods, when they approach to bite, gracefully floating their long, white-tipped middle and hind legs."

The adults "approach to bite," but it is doubtful if they ever do so, or at least commonly.

Panama.

Tabernilla, Canal Zone, larvæ in bamboo-joints, eggs May 1, adult issued May 14, larvæ May 3, 5, 9, pupæ May 22, 1907 (A. Busck).

The development of this species is remarkably rapid, far exceeding that of *Joblotia digitatus*.

UNIDENTIFIED GENERA.

Genus GOELDIA Theobald.

Goeldia Theobald, Mon. Culic., iii, 330, 1903.

The type species is *Goeldia fluviatilis* Theobald, sole species originally included.

ORIGINAL DESCRIPTION OF GENUS GOELDIA:

Head clothed with flat scales; mesothorax with flat spindle-shaped scales and larger narrow-curved ones, lanceolate in form before the scutellum; scutellum with flat scales; metanotum with chaetae and squamae. Palpi in the ♂ nearly one-third the length of the proboscis, in the ♀ quite small; proboscis short and thick, not as long as the body. Wing scales like *Runchomyia*, dense and elongated, ending asymmetrically; the cross-vein in the ♂ as in *Culex;* in the ♀ the mid and supernumerary not united, the posterior as in *Culex*.

This genus is founded on a ♂ specimen; the female described here bears such a strong general resemblance that I have included it under this species.

It differs from *Sabethoides* notably in its *Culex* like venation.

ORIGINAL DESCRIPTION OF GOELDIA FLUVIATILIS:

♂. Head covered with flat grey scales, with dull violet reflections, a pale spot in front and paler round the eyes and at the sides; near the nape are some black upright forked scales, forming a rough line much as in *J. lunata*, Theobald; palpi about one-third the length of the proboscis, completely covered with deep violet scales, so

Digitized by Google

that the jointing cannot be seen; proboscis rather short, deep violet and expanded apically; antennae verticillate, deep brown, basal joint pale testaceous, with black hairs; second joint testaceous at the base, with brown scales, rather swollen; clypeus grey, nude.

Thorax deep brown, covered with narrow-curved bronzy scales, except on the base of the wings, where they become broader, and also in front of the scutellum; there are also long bristles over the roots of the wings; prothoracic lobes with pale grey, almost dull white scales; pleurae testaceous, with grey scales; scutellum densely clothed with broad flat scales with violet reflections; there appear to be two long lateral and two small median border-bristles to the mid lobe; metanotum deep black, with a tuft of black chaetae and scales.

Abdomen testaceous, covered with flat violet scales, brown in some lights, the testaceous ground colour shows through the scales; posterior border-bristles minute; venter pale yellowish-grey, the last segment bristly, the black bristles extending on to the venter. Legs brown, unbanded, with metallic reflections, the apex of the hind tibiae swollen and ciliated; on the apical half is a white patch on the lower surface spreading unevenly on to the upper surface, but not forming a complete band; knee spots pale; fore and mid claws rather long, equal and simple; hind small, equal and simple.

Wings densely clothed; first sub-marginal cell longer and narrower than the second posterior, its base nearer the base of the wing, its stem very short, stem of second posterior nearly as long as the cell; posterior not quite its own length distant behind the mid, the mid-cross vein and the supernumerary unite as in *Culex;* the wings have a pale spot at the base; halteres with pale stem and slightly fuscous knob.

Length.—6 mm.

♀. Head brown, with flat brown scales, a median area of flat white ones, and flat white ones at the sides; palpi brown, with a few grey scales at the apex; proboscis black; clypeus nude, fawn coloured; antennae brown, basal joint with a few small black bristles.

Thorax brown, with flattish narrow spindle-shaped bronzy brown scales, which become larger, more elongate and lanceolate before the scutellum; scutellum testaceous, prominently trilobed, with dense flat dusky-black scales with violet reflections and black border-bristles; metanotum deep brown, with flat white scales and four chaetae in a row; prothoracic lobes with flat dusky scales and black bristles, three prominent ones on each side in front; pleurae ochraceous, with grey and white scales.

Abdomen covered with dusky black scales with dull violet reflections; venter dull ochraceous.

Legs brown, with dull ochraceous reflections, bases dull ochraceous; ungues brown, of moderate size, equal and simple.

Wings with rather broad dense brown scales; first sub-marginal cell longer and narrower than the second posterior cell, its base a little the nearer the base of the wing, its stem about one-third of the length of the cell; stem of the second posterior nearly half the length of the cell; posterior cross-vein not its own length distant from the mid; the mid cross-vein is not quite in a line with the supernumerary.

Halteres with deep ochraceous stem and fuscous knob.

Length.—6.1 mm.

Habitat.—British Guiana (Dr. Low), Brazil (Dr. Lutz).

Observations.—Described from a single perfect ♂ sent by Dr. Lutz. The ♀ described here taken by Dr. Low in the bush on the Demerara River bears a strong resemblance to the ♂, that I have provisionally placed it here, with some doubt, however, as the legs have no white area as seen in the ♂, and the metathoracic scales are white, whilst Dr. Lutz says of the ♂ that they are white and blue (none remain on the specimen sent); these may nevertheless be only sexual differences. It bears a certain resemblance to *Joblotia lunata*, but the abdomen has not lateral apical spots, and the ♂ differs in the palpi, and the ♀ in venation and absence of lateral spots. From *Runchomyia frontosa* it differs in the much shorter proboscis.

We are unacquainted with the above except by description; but it appears extremely probable that the male and female described as sexes of one species are really not conspecific. Moreover, the male may be really a female, in which case, as the genus is based on the supposed male, the characters would prove very similar to those of *Lesticocampa.* Therefore, suspecting that *Goeldia* might possibly prove an earlier name for *Lesticocampa,* we applied to Mr. F. W.

Digitized by Google

Edwards of the British Museum for information. He kindly replied as follows (in litt., January 6, 1912); "Unfortunately the type of *Goeldia fluviatilis* has disappeared from our collection, like several others. What has happened to it I do not know, unless Theobald has removed it for further examination; perhaps he never really placed it here." The female specimen Mr. Edwards finds to be in the collection, but as the male is stated to be the type and the female probably is wrongly associated, we are obliged, from lack of information, to leave the name *Goeldia* unplaced.

Genus ISOSTOMYIA Coquillett.

Isostomyia **Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 16, 24, 1906.**

The type species is *Aëdes perturbans* Williston by original designation.

ORIGINAL DESCRIPTION OF AEDES PERTURBANS:

Ædes perturbans **Williston, Trans. Ent. Soc. Lond., 271, 1896.**

♂, ♀. Head black. Antennæ brown; plumosity of the male long, abundant and black; terminal joint as long as the seven or eight preceding it together, and clothed with short hair; in the female the joints are more slender, and the terminal one is not longer than the two preceding it taken together, the verticils of moderate length. Proboscis black, as long as the abdomen; palpi brown. Thorax yellow, the mesonotum a little darker, and clothed with brown squamulae. Abdomen yellowish, brownish-yellow or brown, the terminal segments and the hypopygium brown or blackish; clothed above with brown squamulae. Legs brown or blackish, the femora, for the most part, yellow, and with a purplish or greyish reflection in some lights; in some specimens the tibiæ largely yellowish beneath the tomentum. Veins of the wings uniformly dark-brown squamulate. Length 4–5 mm.

Eight specimens.

Island of St. Vincent, West Indies.

Mr. F. W. Edwards informs us (in litt., October 30, 1912) that the type of *I. perturbans* (Williston) is in the British Museum, rather damaged, but a typical sabethine, differing from *Lesticocampa* in having short palpi in the male. The palpi are short in our species, *Lesticocampa dicellaphora,* so it is probable that *Isostomyia* is a synonym of *Lesticocampa.* We have omitted the name from the synonymy (page 162), as we are autoptically unacquainted with the type species, *perturbans,* and find Dr. Williston's description insufficient. This may prove an earlier name for our *dicellaphora,* but the localities are remote, *perturbans* being described from the island of St. Vincent, *dicellaphora* from Panama. We do not feel justified in making even a tentative reference. We treat Williston's *perturbans* as the type of *Isostomyia* because it is the only species included by Coquillett, although the characters which he gives were taken from a *Culex* which he erroneously supposed to be Williston's *perturbans.* See the discussion under *Culex conservator* (p. 219) for statement of Coquillett's erroneous identification of *Aëdes perturbans.*

Digitized by Google

Digitized by Google

Tribe CULICINI.

The proboscis is well developed. Eyes large, but never broadly contiguous above. Palpi generally small in the female, but as long as the proboscis in the more generalized anophelines; generally long in the male, often considerably exceeding the proboscis in length, but short in specialized forms in several genera. Antennæ with the joints of the shaft subequal in the female, in the male usually all but the last two much shortened and with the hairs of the whorls long and dense. In the group typified by *Deinocerites,* however, the antennæ of the male essentially resemble those of the female, being entirely without the peculiar shortening of the basal joints. Vertex usually with a tuft of long hairs or scales projecting forward between the eyes. Setæ of mesonotum usually well developed, most forms with strong subdorsal longitudinal rows on the disk, besides marginal setæ and those at the roots of the wings. Postnotum nude, except in *Dinomimetes* and some *Hæmagogus;* the former has one or two coarse setæ near the posterior angle, the latter two or three minute setæ in some specimens. Abdomen subcylindrical in the female, its shaped varied in the different genera, either truncate at the tip, the cerci not prominent, or produced and tapering, with the terminal segments more or less retractile and the cerci exserted. Scale vestiture of head and body various, either of flat scales throughout or to greater or less extent of narrow curved or otherwise modified ones. Wings moderate, the veins well-scaled, the scales of various shapes, usually narrow and linear, not infrequently of different colors and marked with a pattern, especially in the more generalized forms. Legs not unusually long, except in the anophelines, rarely ornamented with outstanding scales in the form of fringes or tufts. Claws of the feet either toothed or simple, nearly always in part at least toothed in the males. Coloration various, in most forms without marked metallic luster.

The larvæ of the Culicini show great diversities of structure, but, after the first molt, are easily recognizable by the presence of the ventral brush of the last segment. This consists of a series of hairs or hair-tufts along the mid-ventral line, sometimes extending over the whole length of the segment, but more frequently occupying the portion behind the chitinous plate. The head is usually rounded or subquadrate and transverse, elongate in the anophelines and *Uranotænia.* The mouth-brushes are usually well developed, and, in the predaceous forms, are modified for capturing their prey. The mouth-parts proper are of a much more uniform type than in the Sabethini. Great diversity occurs in the development of the antennæ. The most primitive forms, the anophelines, have two independent respiratory openings on the dorsum of the eighth abdominal segment, protected by an imperfect closing apparatus of surrounding chitinous plates. The more specialized forms have a variously modified breathing-tube on the dorsum of this segment; the tracheæ open into a common chamber, which can be closed by a complex mechanism and

Digitized by Google

terminal flaps. The culicine larvæ show more or less pigmentation, even upon the softer parts, and certain forms like *Megarhinus*, and *Orthopodomyia*, are deeply pigmented throughout. Chitinous plates occur dorsally on some of the abdominal segments in certain forms.

Many peculiar adaptations among the larvæ occur, which will be especially described, so far as known, under the several species. Most of the species inhabit temporary or permanent water on the ground, a few occur in water in hollows in trees or rocks, others in water held by bromeliaceous or other plants, while three of our genera are of predaceous habit, feeding upon other mosquito larvæ.

The pupæ of the Culicini are heavily pigmented; they are furnished with a pair of well-developed anal paddles; the seventh and eighth abdominal segments have hairs or very small tufts at the posterior angles, never the large tufts characteristic of the Sabethini. They are free-swimming, except in *Mansonia*, where they are attached to certain aquatic plants from which they derive their supply of air.

The tribe Culicini presents a considerable diversity of structures, although good characters for generic separation are hard to find. The diversity appears more pronounced in many cases in the larvæ and in the life habits. The anophelines appear to be clearly the most generalized mosquitoes, the females still retaining the long palpi, which must be decidedly in the way in performing the act of feeding. We think that the development from a corethrine-like ancestor consisted essentially in the lengthening of all the mouth-parts for piercing, in which the palpi shared. These, being in the way, have been reduced in the more specialized forms, first in the females, to which they were the greatest hindrance, later in the males also. The larvæ also of the anophelines greatly resemble those of the more generalized corethrines and of *Dixa*, and are the only mosquitoes in which the primitive surface-feeding habit has been retained.

The Culicini are a less compact group than the Sabethini, more numerous in genera and species and embracing a wider range of evolutional diversity. We consider the Sabethini on the whole the more specialized group, but many of their characters are more generalized than those of the Culicini or even of the Corethrinæ. We have reference more especially to certain larval characters.

The larvæ of the Sabethini feed largely with the maxillæ, the mouth-brushes being poorly developed, so that when predaceous forms arise the maxillæ become functional as organs of prehension. In the Culicini, on the contrary, the mouth-parts are more subordinated, the mouth-brushes being fully developed, so that in the predaceous forms it is the mouth-brushes that are specialized into organs of prehension. Again, in the Sabethini there is no ventral brush on the anal segment of the larva, all the hairs being paired, while in the Culicini there is an unpaired median ventral brush or rudder; we therefore consider them a separate tribe. The Sabethini are not directly derivable from the Corethrinæ. In the larvæ of the Corethrinæ the ventral brush is present, while most of the species have so far lost the use of the mouth-parts that the antennæ have been transformed into organs of prehension. *Eucorethra* only is generalized in this

Digitized by Google

respect, using chiefly its mandibles to seize its prey, though the antennæ evidently assist in the act of prehension. *Eucorethra,* in short, is close to *Anopheles* in the Culicini, and it is possible to imagine the evolution of this tribe from some ancestor similar to *Eucorethra;* but the Sabethini can not be derived therefrom, nor indeed from any living Corethrinæ known to us.

The Culicini may be divided into four groups on general relationship:

I. THE DEINOCERITINES.

The deinoceritines form a compact group of three genera, *Deinocerites, Dinamesus,* and *Dinomimetes.* We place this group first, largely because it is impossible to interpolate them anywhere and they are in many respects much specialized. The antennæ are essentially alike in the sexes and are more or less elongated, being the most generalized of any mosquito antennæ, although this is more probably a case of degeneration. The antennæ are affected by specialization, and peculiarly modified. All the species live in holes in the earth excavated by certain species of crabs, the larvæ living in the water at the bottom, the adults frequenting the upper parts of the burrows. Special sensitiveness of the antennæ seems necessary to enable the insects to avoid their crustacean host when it returns to its abode, or the fragile mosquitoes, resting upon the sides of the narrow channel, would be dashed into the water beneath and destroyed. Therefore this character, being affected by specialization, largely loses its value in classification, so that we the more readily concede to the group a high position; in fact, from the genitalia, they seem to be a specialization of *Culex.* The larvæ are of a culicine type without any markedly generalized characters. They have peculiar mouth-parts, probably only a special adaptation to their mode of life. The anal gills are absent, which is an unexpected specialization. The larvæ, as far as we know them, and the male genitalia are remarkably uniform, scarcely offering specific differences even. This indicates great stability for the group, which must be well adapted for its habitat, and not now undergoing evolutional change. The sexes present practically no secondary differential character, which confirms the established character of the group and indicates that it has been long separated from the other Culicini.

Two characters shown in the group deserve special mention. The male genitalia, very stable and uniform throughout the species, are of a more specialized type than in any other mosquitoes, an intensification of the *Culex* type with certain special modifications. The other character is the presence of setæ upon the postnotum in one genus, *Dinomimetes.* It was at first supposed by us that this indicated the genus to belong to the Sabethini, and that its otherwise great resemblance to *Deinocerites* was due to convergence owing to similar environment. But further study showed that both the male genitalia, so unique in structure, and the larvæ with their peculiar adaptations, were scarcely specifically distinguishable. The genus is obviously a near relative of *Deinocerites* and we are even in doubt whether these setæ upon the postnotum are of specific value, since two specimens before us seem to lack them. The character is most probably one of recent acquirement, but we are at present unable to conjecture its full significance.

Digitized by Google

II. THE CULICINES.

We recognize eleven genera in the culicines, viz.: *Culex, Carrollia, Lutzia, Culiseta, Mansonia, Psorophora, Aëdes, Hæmagogus, Orthopodomyia, Uranotænia,* and *Aëdeomyia.* A large number of species are represented, especially in *Culex* and *Aëdes.* We consider *Culex* to be evolutionally highest, its species being closely related and often difficult to distinguish, the sexes showing marked secondary differential characters, so that they are in general difficult to associate correctly without breeding records. The genus is apparently now undergoing modification and the species are in a state of plasticity. The larvæ are inhabitants of collections of water of a more or less permanent nature, the eggs generally being laid in rafts. A group or subgenus (*Microculex*) inhabits the water in the leaves of bromeliaceous plants, and has remarkably specialized eggs, being laid in a mass of gelatin, each egg in its own capsule, much as in *Chaoborus* and the Chironomidæ. We do not, however, trace any relationship therefrom, nor consider this a generalized character. Two other subgenera (*Culicella* and *Climacura*) lay single eggs and are otherwise in a generalized condition.

Carrollia is a small group specialized from *Culex; Lutzia* contains a few species whose larvæ have acquired a predaceous habit and feed mostly upon species of *Culex,* its own near relative. *Culiseta* and *Mansonia* are somewhat connecting genera leading downward from *Culex.* The larvæ are all inhabitants of permanent collections of water and the eggs are laid in rafts. *Culiseta* is an intermediate genus of few species, possessing many characters of *Aëdes,* but inclining in habits toward *Culex. Mansonia* is closely allied as adult, but the larvæ have acquired a peculiar adaptation, taking air from the roots of certain aquatic plants by means of their peculiarly modified breathing-tubes, and never coming to the surface.

The following three genera are somewhat less specialized than the foregoing, but have pursued a different course. The larvæ inhabit pools of a temporary nature, the eggs being laid singly and adapted to withstand dessication. This habit has induced various modifications in all stages of the insects. The modification of the eggs has been alluded to: the larvæ develop with great rapidity; the females have a different shape of abdomen adapted for laying the single eggs. They pass through the winter or dry period, according to the region inhabited, in the egg state instead of that of adult or larva. They are thus enabled to occupy territory unadapted to support *Culex* and allies, provided only that water shall accumulate at certain periods to enable larval development. The eggs can survive long periods of drought that would be fatal to the *Culex* adults. Our first genus, *Psorophora,* contains two groups, one with larvæ of predaceous habit, developed from the other group and preying upon it. *Aëdes* itself is our largest genus, exhibiting the characters above described. The species are numerous in temperate and arctic latitudes as well as arid districts, their peculiar habits enabling them to withstand the rigors of an arctic winter as well as the drought of a desert summer. *Hæmagogus* is a small group of tropical distribution in which the characters resemble *Aëdes,* but the special habits are not well evolved. There is a remarkable correspondence with the Sabethini in

Digitized by Google

appearance and in nearly all the characters, but this appears to have been acquired independently. The larvæ frequent the water in hollow trees, and are closely allied to the lower members of *Aëdes* with a similar habit.

Orthopodomyia is, in many respects, our most generalized culicine, the adults with spotted wings and sometimes with broad wing-scales, the larvæ without pecten teeth on the air-tube and furnished with chitinous plates on some of the abdominal segments. They inhabit the water in hollow trees or at the leaf-bases of bromeliads. The eggs are laid singly or in small groups, glued to the sides of the tree-hole above the water. This is probably the generalized type of oviposition of mosquitoes, confirming the position here assigned for the genus. It is worthy of note that this type of oviposition also obtains in the Sabethini.

The genus *Uranotænia* possesses certain specialized characters, such as the habit of laying the eggs in a raft and the reduced palpi of the imagos, but the generalized condition of the larvæ, with elongate heads, like those of *Anopheles*, and the simple male genitalia show that it should occupy a low position.

Aëdeomyia, with its single species, is a peculiarly modified form, especially in the larva, in which the usual respiratory mechanism is nearly obsolete, but its general characters place it the lowest in the series. Both *Uranotænia* and *Aëdeomyia* have acquired short palpi in both sexes, but this character of specialization has been acquired independently by members of different genera and is, therefore, without deep significance.

III. MEGARHININES.

The megarhinines contain the single genus *Megarhinus*. It is allied to the lowest of the culicines and perhaps developed from a form like *Orthopodomyia*. The larvæ are predaceous on *Orthopodomyia* and other tree-hole inhabiting mosquito larvæ. The genus is somewhat isolated and has developed certain specializations, so that we rank it as a separate group, although it is not strongly disconnected. In fact, our three last groups, the culicines, megarhinines, and anophelines present a rather uniform line of ascent, not sharply broken anywhere and lead up also to the deinoceritines. *Megarhinus* resembles *Anopheles* in the scanty development of the setæ of the mesonotum, the three longitudinal rows of setæ across the disk of the mesonotum, so conspicuous in the deinoceritines and most culicines being here wanting. In this respect the Sabethini agree, and we take this to be a character of generalization. *Megarhinus* also resembles *Anopheles* in the shape of the scutellum, which is not distinctly trilobed. The species are large, as befits their predaceous habit. The adults are very showy; they have a rigid proboscis which has become adapted to extracting honey from flowers. The American species have the palpi long in both sexes, but in the Old World forms, the palpi of the female are shortened.

IV. THE ANOPHELINES.

The anophelines contain the lowest of the true mosquitoes. We recognize two genera, *Anopheles* and *Cœlodiazesis*. The group, although generalized, is stable, the species closely allied, yet distinct. The larvæ are very uniform, many being hardly distinguishable from one another specifically. The habits are almost identical throughout. The male genitalia are of a very simple type like

Digitized by Google

that of the Corethrinæ. It is evident that the group is an old and fixed one not now undergoing rapid evolution. The palpi are long in both sexes, a generalized character, while the wings are generally spotted, as in the lowest forms.

The larvæ float at the surface and have not developed a long breathing-tube, being most comparable with the lower forms of the Corethrinæ, such as *Eucorethra,* and with *Dixa.* They are somewhat specialized for the surface-feeding habit, the head being more completely rotary than in *Dixa,* while a number of tufts of flattened hairs along the back serve as attachments to the surface film. The adaptations, however, are of no fundamental nature and the whole organization is distinctly generalized. The eggs are laid singly, floating on the surface of the water, and are supplied with curious floats, differing greatly in the different species. This is a distinct specialization and is yet in an unstable condition, as witnessed by the great specific diversity, so contrary to the state of most of the other structures of the anophelines. The larvæ are less specialized than any of those in the preceding groups in regard to their choice of habitat, almost any kind of water serving their purpose. Two species inhabit tree-holes, others the water collected at the leaf-bases of bromeliaceous plants, but these are exceptions and indicate a condition of atavism, since we suppose the ancestor of the mosquitoes to have been a form probably breeding in water held by plants.

TABLES OF THE GENERA OF THE TRIBE CULICINI.

ADULTS.

1. Wings with the second marginal cell at least as long as its petiole..... 3
   Second marginal cell less than half as long as its petiole..... 2
2. Proboscis rigid, down curved..... *Megarhinus* Robineau-Desvoidy (iv, p. 927)
   Proboscis flexible, normal..... *Uranotænia* Lynch Arribálzaga (iv, p. 898)
3. Scutellum rounded, not lobed..... 4
   Scutellum distinctly trilobed..... 5
4. Mesothorax elongate, over twice as long as wide
   Anopheles Meigen (iv, p. 962)
   Mesothorax rounded, not over twice as long as wide
   Cœlodiazesis Dyar & Knab (iv, p. 1035)
5. Antennal joints short and broad in the female, the two terminal joints much broader than the preceding ones in the male
   Aedeomyia Theobald (iv, p. 893)
   Antennal joints long and slender, at least in the female..... 6
6. Second joint of antennæ very long, 8 to 14 × 1 in ♀; ♂ antennæ unmodified, similar to those of the female..... 15
   Second joint of ♀ antennæ short, less than 6 × 1; ♂ antennæ modified, the joints shortened except the last two..... 7
7. Prothoracic lobes approximate.....*Hæmagogus* Williston (iv, p. 863)
   Prothoracic lobes well separated..... 8
8. Cross-veins tending to lie in line, the posterior separated from the anterior by less than its own length; palpi of the male usually club-shaped
   Culiseta Felt (iii, p. 474)
   Cross-veins normal, usually widely separated..... 9
9. Fourth joint of fore tarsus very short... *Orthopodomyia* Theobald (iv, p. 877)
   Fourth joint of fore tarsus longer, normal..... 10
10. Feet with large empodia.. ..... *Lutzia* Theobald (iii, p. 466)
    Feet with small empodia..... 11
11. Hind tibial scraper with 0–5 sparsely set teeth; abdomen of the female blunt at the tip with short retractile cerci..... 12
    Hind tibial scraper with 7–12 closely set teeth..... 13
12. Abdomen subcylindrical or depressed..... *Culex* Linnæus (iii, p. 215)
    Abdomen strongly compressed..... *Carrollia* Lutz (iii, p. 461)
13. Female with tip of abdomen tapering, cerci exserted; male genitalia without a process from the inner angle of side-piece..... 14
    Female with tip of abdomen truncated, cerci concealed; male genitalia with a long rod-like process from the inner angle of side-piece
    Mansonia Blanchard (iii, p. 501)

Digitized by Google

14. Eighth abdominal segment entirely retractile, membranous and naked in the female; male genitalia with the harpagones with multiple terminal appendages ..... *Psorophora* Robineau-Desvoidy (iv, p. 525)
Eighth abdominal segment only partly membranous and retractile in the female; ♂ genitalia, with the harpagones with only one terminal appendage ..... *Aëdes* Meigen (iv, p. 607)
15. Postnotum nude 16
Postnotum with one or two setæ posteriorly.... *Dinomimetes* Knab (iii, p. 196)
16. Second joint of antennæ 6 to 8 × 1..... *Dinanamesus* Dyar & Knab (iii, p. 213)
Second joint of antennæ 12 to 14 × 1..... *Deinocerites* Theobald (iii, p. 199)

TABLE OF GENERA BY THE MALE GENITALIA.

1. Harpes present 2
Harpes absent 11
2. Harpagones present 3
Harpagones absent 8
3. Side-pieces with appendages or prominences, but not lobed..... 4
Side-pieces without appendages, though often with lobes..... 5
4. Harpagone developed into a long spatulate appendage
Deinocerites Theobald (iii, p. 199)
Dinomimetes Knab (iii, p. 196)
Dinanamesus Dyar & Knab (iii, p. 213)
Harpagone divided or cleft, not produced.....
Culex Linnæus (iii, p. 215)
Carrollia Lutz (iii, p. 461)
Lutzia Theobald (iii, p. 466)
5. Harpagone slender, rod-like, with apical appendages, rarely reduced to a conical lobe with seta-like appendage..... 6
Harpagone a rod or teeth jointed upon a basal cone or elongate appendage
Mansonia Blanchard (iii, p. 501)
6. Apical appendages of harpagones multiple
Psorophora Robineau-Desvoidy (iv, p. 525)
Apical appendage of harpagones single..... 7
7. A fringe of broad scales on inner edge of side-pieces
Hæmagogus Williston (iv, p. 863)
No such fringe present..... *Aëdes* Meigen (iv, p. 607)
8. Harpes moderate; clasp-filament moderate in length..... 9
Harpes very large and prominent; clasp-filament long
Megarhinus Robineau-Desvoidy (iv, p. 927)
9. Side-piece with large conical basal lobe
Orthopodomyia Theobald (iv, p. 877)
Culiseta Felt (iii, p. 474)
Culex subgenus *Culicella* Felt (iii, p. 457)
Culex subgenus *Climacura* Howard, Dyar & Knab (iii, p. 452)
Side-piece without such a lobe..... 10
10. Side-piece with small setose basal lobe; clasp-filament distorted or divided
Aëdes sylvestris Theobald (iv, p. 694)
Aëdes fuscus Osten Sacken (iv, p. 729)
Side-piece without basal lobe; clasp-filament simple
Aëdes calopus Meigen (iv, p. 824)
11. Basal appendages numerous, though not developed into harpes or harpagones
Uranotænia Lynch Arribálzaga (iv, p. 898)
No true basal appendages besides the unci..... 12
12. Side-piece with basal setose lobe; unci large, capitate
Aëdeomyia Theobald (iv, p. 893)
Side-piece without basal setose lobe; unci small, slender
Anopheles Meigen (iv, p. 962)
Cœlodiazesis Dyar & Knab (iv, p. 1035)

TABLE OF GENERA BY THE LARVÆ.

1. Air-tube short, sessile, the larvæ surface-feeders..... 2
Air-tube distinctly elongate..... 3
2. Abdomen with plumose lateral hairs on the first three segments only; head with plumose hairs..... *Anopheles* Meigen (iv, p. 962)
Abdomen with plumose lateral hairs to the sixth segment; head with small simple hairs only..... *Cœlodiazesis* Dyar & Knab (iv, p. 1035)
3. Air-tube without pecten..... 4
Air-tube with a well-developed pecten..... 7

Digitized by Google

4. Mouth-brushes normal 5
   Mouth-brushes of lamellate prehensile plates
   Megarhinus Robineau-Desvoidy (iv, p. 927)
5. Air-tube with the outer half attenuated..... *Mansonia* Blanchard (iii, p. 501)
   Air-tube cylindrical or fusiform..... 6
6. Antennæ large, dilated..... *Aëdeomyia* Theobald (iv, p. 893)
   Antennæ small, slender.....*Orthopodomyia* Theobald (iv, p. 877)
7. Air-tube with but a single pair of ventral tufts..... 8
   Air-tube with several pairs of ventral tufts..... 12
8. Head elongate elliptical..... *Uranotænia* Lynch Arribálzaga (iv, p. 898)
   Head nearly circular or transverse..... 9
9. Air-tube pecten produced into long hairs; hair tuft close to base
   Culiseta Felt (iii, p. 474)
   Air-tube pecten of short scales or if produced the hair tuft remote from base. 10
10. Mandible angularly projecting laterally .. { *Deinocerites* Theobald (iii, p. 199) / *Dinomimetes* Knab (iii, p. 196)
    Mandible concealed 11
11. Anal segment ringed by plate, with ventral hair-tufts piercing the ring
    Psorophora Robineau-Desvoidy (iv, p. 525)
    Anal segment not ringed, or if so with the hair-tufts posterior to the ring
    { *Aëdes* Meigen (iv, p. 607) / *Hæmagogus* Williston (iv, p. 863)
12. Mouth-brushes prehensile hooked lamellæ..... *Lutzia* Theobald (iii, p. 466)
    Mouth-brushes normal 13
13. Air-tube with moderately long or few hair-tufts outwardly
    Culex Linnæus (iii, p. 215)
    Air-tube with a ventral row of very closely placed hair-tufts
    Carrollia Lutz (iii, p. 461)

The genus *Dinanamesus* Dyar & Knab is not included, the larvæ being unknown.

Group DEINOCERITINES.

Genus DINOMIMETES Knab.

Dinomimetes Knab, Journ. N. Y. Ent. Soc., xv, 120, 1907.
Dinomimetes Theobald, Mon. Culic., v, 553, 1910.

The type species of *Dinomimetes* Knab is *Dinomimetes epitedeus* Knab.

GENERIC DIAGNOSIS OF ADULT:

Palpi short in both sexes, three-jointed, the last joint longer than the two preceding. Antennæ long and slender, similar in the sexes, longer in the male, whorls at bases of joints short, hardly differentiated from the scattered hairs on the shaft; second joint about sixteen times as long as wide, slightly shorter in the female; third joint slightly shorter and more slender than the second in the male, about five-sixths as long in the female; succeeding joints gradually diminishing in length in the male, the fourth and fifth long in the female, the others considerably shorter. Prothoracic lobes remote dorsally. Mesonotum with longitudinal rows of coarse setæ. Postnotum usually with two minute bristles inserted mesially near the posterior margin, varying in number, possibly rarely absent. Abdomen compressed, truncate at tip in the female, the cerci stout, conical; abdomen of the male subcylindrical, somewhat expanded at tip, with stout claspers. Legs long and slender; all the claws simple in the female, one claw with basal lateral tooth on the front and middle legs in the male.

GENERIC DIAGNOSIS OF LARVA:

Structurally identical with that of *Deinocerites*.

East coast of Costa Rica to Panama.

The genus *Dinomimetes* was originally supposed to be a sabethine on account of the presence of setæ upon the postnotum, but we now recognize it to belong to the deinoceritines. The setæ on the postnotum appear to be in a somewhat unstable condition, and we have some specimens in which they appear to be absent. These setæ are stouter and fewer in number than in any sabethines known to us, and, although similarly located, it appears that they are not homologues with those. We retain the genus on the character of the presence of these setæ, although recognizing that it is a rather weak one. The antennæ of the female, being similarly modified to those of the male in regard to the proportionate

Digitized by Google

lengths of the joints, sets the group somewhat apart, although this is not by itself a character of generic value.

The larvæ live in the water in holes formed by certain species of crabs along the coast.

But a single species is known.

DINOMIMETES EPITEDEUS Knab.

Deinocerites cancer Knab (in part), Psyche, xiii, 95, 1906.
Dinomimetes epitedeus Knab, Journ. N. Y. Ent. Soc., xv, 120, 1907.
Dinomimetes epitedeus Busck, Smiths. Misc. Colls., quart. iss., iii, 75, 1908.
Dinomimetes epitedeus Theobald, Mon. Culic., v, 553, 1910.

ORIGINAL DESCRIPTION OF DINOMIMETES EPITEDEUS:

Female: Antennæ, the tori small, globular, ochraceous, naked; second segment extremely long; third segment about two-thirds as long, the following ones successively shorter; the segments are densely ciliate and bear many scattered longer setæ; the second segment brown scaled. Clypeus elongate, conical, naked. Labial palpi moderately short. Occiput clothed with narrow pale brownish recumbent scales and a few scattered erect forked ones; along the posterior margin a dense confused row of erect forked scales. Prothoracic lobes prominent. Mesonotum brown, the scale vestiture bronzy brown, having two submedian bare stripes and with numerous coarse setæ, mostly in subdorsal and lateral rows, longest and most closely placed on the posterior portion. Scutellum distinctly trilobed, yellow-brown, with three patches of brown scales and groups of long coarse setæ on the lobes. Metanotum rather narrow, elongate, with a group of setæ near the apex. Postscutellum clothed with dull brown scales and with many pale setæ, somewhat produced at the middle where there is a double ridge of erect scales. Abdomen long and slender, blunt at apex, the cerci small, slender and pointed. Vestiture of the abdomen above dull brown, beneath dull yellowish bronze. Wings rather broad, the scales of the veins brown and mostly narrow. Basal cross-vein slightly oblique, more than its own length behind the anterior cross-vein. Knobs of the halteres brown scaled. Legs brownish black, unicolorous. Claws small and simple.

Length of body, about 5 mm.; of wing, 4 mm.

Male: Very similar to the female; the antennæ even longer; the third segment hardly shorter than the second, the fourth but little shorter than the third; terminal segments much shortened. Palpi slender, about equal to those of the female in length. Abdomen subcylindrical, slightly expanded at the apex and with large very stout claspers. All the claws simple, those of the front and middle legs very long, those of the hind legs small.

Length of body, 4 mm.; of wing, 4 mm.

Locality.—Port Limon, Costa Rica (2 ♀♀, 1 ♂, F. Knab).

Type.—No. 10291, U. S. National Museum.

This mosquito has a deceptive resemblance to *Deinocerites cancer* Theob. and like it occurs in crab-holes. My remarks in Psyche, xiii, p. 95 on the occurrence of *Deinocerites cancer* at Port Limon apply to this species. At the time the article was written the specimens in question were in the hands of Mr. Coquillett and were not accessible for study.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF DINOMIMETES EPITEDEUS:

Female.—Proboscis rather long, slightly thickened towards apex; labellæ rather large, conical; setæ rather long, dense, those on labellæ more prominently outstanding; vestiture of brownish-black scales. Palpi short, about one-sixth as long as proboscis, brown scaled, with outstanding setæ. Antennæ long, filiform, very slender, coarsely ciliate, with scattered large setæ; second joint about fourteen times as long as wide, succeeding one about ten times as long as wide, the rest progressively shorter, penultimate one about four times as long as wide, the last longer and pointed at tip; tori subspherical with a cup-shaped, apical excavation, luteous brown, darker within; hairs of whorls sparse, short, black, somewhat obscured by the coarse ciliation. Clypeus elliptical, prominent, conical, dark brown, nude. Eyes broadly contiguous above, black. Occiput clothed with narrow, curved, pale bronzy-brown scales, those along margin of eyes denser, broader, and paler, numerous erect, forked, pale bronzy-brown ones forming a dense mass; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with black bristles.

Digitized by Google

Mesonotum clothed with narrow, curved bronzy-brown scales; a pair of bare subdorsal stripes, rather narrow and close together; setæ abundant, long, coarse, arranged in broad subdorsal and marginal rows, longest posteriorly. Scutellum trilobate, clothed with bronzy-brown scales, each lobe with a group of coarse black setæ. Postnotum rather narrow, convex, dark brown, smooth, with a group of small setæ towards the hind margin. Pleuræ and coxæ luteous brown with a vertical patch of bronzy-brown scales on the mesopleura and rows of rather coarse dark bristles.

Abdomen subcylindrical, compressed, truncate at apex, the cerci moderate, subconical, with many fine hairs; first segment with numerous brown hairs dorsally; last segment of abdomen finely hairy on lower surface posteriorly; vestiture above of dull-brown scales with bronzy and blue luster, beneath dull yellowish, submetallic; setæ numerous, those on hind margin of segments coarser.

Wings rather broad, hyaline; petiole of second marginal cell about one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; scales of veins narrowly ovate to ligulate, a few with subtruncate apices, densest and longest on forks of second vein; bronzy brown, with blue reflection along the costa. Halteres pale with black knobs.

Legs long and slender, the middle femora stouter than the others; vestiture of bronzy-brown scales, with a blue reflection in some lights; femora dull yellowish beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis moderately long and slender, with a suture beyond the middle. Antennæ very long, exceeding the body in length; second joint about sixteen times as long as wide, third joint about twelve times as long as wide, the succeeding ones progressively shorter, the penultimate one about five times as long as wide, the last joint thickened slightly, about as long as the penultimate. Hairs of whorls sparse, shorter than in the female, somewhat obscured by the coarse ciliation. Palpi very short, about one-sixth as long as proboscis. Coloration as in the female. Wings narrower than in the female, stems of fork-cells longer, basal cross-vein about twice its length from the anterior. Abdomen subcylindrical, somewhat enlarged apically, the setæ coarser than in the female, particularly apically. Claws on the front and middle legs rather large and subequal, the outer one with a tooth at base along inner side; formula, 1.0–1.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Genitalia (plate 8, fig. 53): Side-pieces over twice as long as wide, stout, a rounded conical apical lobe on inner angle bearing fine setæ, a notch at middle of inner margin bearing two short, very stout teeth and a slender spine within a rounded prominence. Clasp segment small, stout, and chitinized like the side-pieces, constricted near base, swollen apically and bearing one stout and one small terminal claw within an apical notch, outer aspect densely clothed with fine hairs. Harpes broad, rounded, apical margin clothed with a row of about twenty-three stout, fine even teeth. Harpagones divided into three portions, the middle one with a row of long teeth, inner one with the tips pointed and curved inward, not as long as the harpes; outer portion very long, broad at base, tip spatulate, reaching beyond the lateral teeth of the side-piece, smooth. Unci forming a broad truncate cone.

Larva, Stage IV (plate 95, fig. 309).—Head rounded, beneath an angular, laterally projecting lobe to cover basal process of mandibles; antennæ rather long and slender, uniform, a tuft near middle; upper head-hair in twos, lower single, long. Lateral abdominal hairs in fours on first segment, then in twos to fifth segment, single on sixth; lateral comb of eighth segment of many spines in

Digitized by Google

a very large triangular patch. Air-tube about five times as long as wide, the pecten of five coarse, sparsely-set teeth, reaching nearly half the length of the tube; a double-haired tuft beyond it, a small single hair near tip and another on dorsal aspect. Anal segment longer than wide, with an illy defined dorsal plate, which is spiny on its posterior portion; a small ventral plate between brush and base. Dorsal tuft of a long hair and a multiple tuft on each side; lateral hair small, single; ventral brush arising from a prominent barred area. Anal gills two, equal, elliptical, over half as long as anal segment.

The larvæ live in crab-holes in a similar manner to those of *Deinocerites*. The specimens taken by Mr. Knab at Port Limon were in crab-holes on a side hill beyond the reach of tide-water, the contained water being fresh, furnished by a small rivulet. The water-surface was at a depth of several feet below the orifices of the holes. The adults were found resting in the upper parts of the holes in company with numerous specimens of *Culex latisquama* and *Culex extricator*. Mr. Busck collected this species from a series of crab-holes near Colon, some of which at least contained brackish water. He obtained also *Deinocerites melanophylum* and *Culex extricator* from these holes, but the catches from the different holes were not differentiated, and it is possible that those containing the *Dinomimetes epitedeus* and *Culex extricator* may have contained fresher water. Mr. Jennings obtained a series of specimens on Caldera Island from crab-holes which contained also some *Culex extricator* and no *Deinocerites*.

East coast of Costa Rica to Panama.

Port Limon, Costa Rica, adults and larvæ in crab-holes, September 30, 1905 (F. Knab); Colon, Panama, adults and larvæ in crab-holes near the coast, July 20, 1907 (A. Busck); Caldera Island, Porto Bello Bay, Panama, adults and larvæ in crab-holes, January 19, 20, 1908 (A. H. Jennings). Two specimens taken by Mr. Jennings at the same place January 4 and 19 are apparently without setæ on the postnotum.

The hairs on the postnotum are not a group of independent hairs, as in the Sabethini. Usually there are two hairs, springing from a common base; sometimes there is only a single hair. These hairs are coarser than those similarly situated in the Sabethini.

Genus DEINOCERITES Theobald.

Deinocerites Theobald, Journ. Trop. Med., iv, 235, 1901 (without species).
Brachiosoma Theobald, Journ. Trop. Med., iv, 235, 1901 (without species).
Deinocerites Theobald, Mon. Culic., ii, 215, 1901.
Brachiomyia Theobald, Mon. Culic., ii, 343, 1901.
Deinokerides Giles, Gnats or Mosq., 2 ed., 335, 472, 1902.
Brachiomyia Giles, Gnats or Mosq., 2 ed., 335, 473, 1902.
Deinocerites Theobald, Mon. Culic., iii, 275, 1903.
Deinocerites Sergent & Sergent, Guide Prat. étud. moust., 69, 1903.
Deinocerites Lahille, Class. des Moust., 14, chart, 1904.
Dinocerites Blanchard, Les Moustiques, 413, 1905.
Brachiosoma (as synonym of *Dinocerites*) Blanchard, Les Moustiques, 414, 1905.
Deinocerites Dyar, Proc. Ent. Soc. Wash., vii, 45, 49, 1905.
Deinocerites Theobald, Mosq. or Culic. Jamaica, 8, 1905.
Deinocerites Theobald, Gen. Ins., Dipt., fasc. 26, 37, 1905.
Deinocerites Felt, N. Y. State Mus., Bull. 97, 491, 1905.
Deinoceritinae Mitchell, Psyche, xiii, 19, 1906.
Deinocerites Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 178, 188, 1906.
Deinoceritinae Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 11, 26, 1906.
Deinocerites Knab, Psyche, xiii, 95, 1906.
Deinoceritinae Mitchell, Psyche, xiv, 11, 1907.
Deinocerites Knab, Journ. N. Y. Ent. Soc., xv, 121, 1907.
Deinocerites Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Deinoceratinae Theobald, Mon. Culic., iv, 18, 1907.
Deinocerites Williston, Man. No. Am. Dipt., 3 ed., 107, 1908.
Deinocerites Pazos, San. y Ben., ii, 41, 43, 1909.
Deinoceratinæ Theobald, Mon. Culic., v, 553, 1910.

Digitized by Google

The type species are: of *Deinocerites* Theobald, *Deinocerites cancer* Theobald; of *Brachiomyia* Theobald, *Brachiomyia magna* Theobald; of *Deinokerides* Giles, *Deinocerites cancer* Theobald; of *Brachiosoma* Theobald, no species included; of *Brachiosoma* Blanchard, *Deinocerites cancer* Theobald.

GENERIC DIAGNOSIS OF ADULT:

Palpi short in both sexes, three-jointed, the last joint longest. Antennæ long and slender, similar in the sexes, the whorls of hairs at the bases of the joints short and sparse, inconspicuous, the shaft with scattered hairs and coarse pubescence; second joint about fourteen times as long as wide, or more; the third joint about two-thirds the length of the second in the male, the succeeding joints successively shorter; in the female the third joint is about one-third as long as the second, the succeeding joints subequal. Prothoracic lobes remote dorsally. Mesonotum with longitudinal rows of coarse setæ. Postnotum nude. Abdomen compressed, truncate at the tip in the female, the cerci stout, conical; abdomen of the male subcylindrical, somewhat expanded at the tip, with stout claspers. Legs long and slender, the claws simple in the female, toothed on some of the claws in the males of some of the species.

GENERIC DIAGNOSIS OF LARVA:

Head large, transverse, rounded, ventral surface forming a lobe with a laterally projecting angle to cover a process at base of mandible; antennæ slender, with small median hair-tuft. Lateral comb present on the eighth abdominal segment. Air-tube elongate, with sparse basal pecten, followed by a single hair-tuft. Anal segment with dorsal plate and ventral brush; anal gills two, rudimentary.

Littoral of the West Indian islands and Trinidad, southern Florida, both Atlantic and Pacific coasts of Central America. The species are confined to the crab-holes along the shore within reach of tide-water.

The genus was at first involved in considerable confusion, the males and females being described separately, two genera being erected on characters derived from defects in the specimens, and the male of a species of *Culex* being at first thought to be the male of *Deinocerites*. The matter was finally settled by the receipt of sufficient good material. The name *Brachiosoma,* proposed by Theobald, is without type, as no species were referred to it by its author. It is treated by Blanchard as a synonym of *Deinocerites,* and is thus first validated. It must be credited to Blanchard, with *cancer* as type and considered as a synonym of *Deinocerites*. Mr. Theobald reduced the genera to one and Mr. Coquillett united the supposed two species. The genus, together with its nearest relatives, *Dinomimetes* and *Dinanamesus,* forms a very distinct group without close relationships. It is, however, clearly not of subfamily rank, to which it has been hastily assigned by three authors.

The larvæ inhabit crab-holes near the sea which are filled with brackish water. The eggs and egg-laying habit are unknown. The larvæ feed upon the matter in suspension in the water, of which the excrement of the crab not improbably forms an important part. The larvæ are in no sense parasitic on the crabs, as stated by Wesché (Journ. Roy. Micros. Soc., 1904, 35). The adults also frequent the upper parts of the crab-holes above the water and do not wander far from these situations. It is probable that they do not bite, at least not warm blooded animals.

TABLE OF THE SPECIES.

ADULTS, STRUCTURE AND COLORATION.

1. Cerci of female large, conical, with two large terminal spines; claws of the male in part toothed 2
   Cerci of the female without terminal spines, hairy; claws of the male simple *pseudes* Dyar & Knab (p. 210)
2. Cerci of female obliquely truncate, one spine below other; claws of male on front and mid tarsi with a basal tooth.. *troglodytus* Dyar & Knab (p. 206)
   Cerci of female conical, both spines apical; teeth on claws of tarsi of male not basal 3

Digitized by Google

3. Cerci elongate, slender; antennæ of the male with the last joint short and enlarged ..... *cancer* Theobald (p. 201)
   Cerci stouter, tip conical; antennæ of the male with the last joint slender, resembling the penultimate..... 4
4. Spines of cerci nearly as long as the cercus. *melanophylum* Dyar & Knab (p. 207)
   Spines of cerci about one-half as long as the cercus *tetraspathus* Dyar & Knab (p. 209)

MALE GENITALIA, DINOMIMETES, DEINOCERITES AND DINANAMESUS.

1. The two terminal claws of clasp-filament equal..... 2
   One of the terminal claws of clasp-filament smaller..... 4
2. Teeth of harpe 14 to 16 in number..... 3
   Teeth of harpe about 20 in number *Deinocerites melanophylum* Dyar & Knab (p. 209)
3. Outer lobe of harpago short and stout, three or four times as long as broad *Deinocerites troglodytus* Dyar & Knab (p. 207)
   Outer lobe of harpago five or six times as long as broad *Deinocerites cancer* Theobald (p. 204)
4. Unci simple, pointed, conical..... *Dinanamesus spanius* Dyar & Knab (p. 215)
   Unci joined to form a broadly truncated basal cone..... 5
5. Outer division of harpago rather short, not exceeding lateral appendage of side-piece ..... *Deinocerites pseudes* Dyar & Knab (p. 211)
   Outer division of harpago long, exceeding lateral appendage of side-piece *Dinomimetes epitedeus* Knab (p. 198)

The species *Deinocerites tetraspathus* is not included, as we have no male specimen.

LARVÆ (DINOMIMETES AND DEINOCERITES).

1. Lower head-hair double..... *Deinocerites cancer* Theobald (p. 204)
   Lower head-hair single..... 2
2. Anal gills over twice as long as wide..... *Dinomimetes epitedeus* Knab (p. 198)
   Anal gills very short, not as long as wide..... 3
3. Lateral hair of anal segment branched; an oblique lateral patch of spines *Deinocerites pseudes* Dyar & Knab (p. 212)
   Lateral hair of anal segment simple { *Deinocerites melanophylum* Dyar & Knab (p. 209) / *Deinocerites troglodytus* Dyar & Knab (p. 207)

The species *Deinocerites tetraspathus* and *Dinanamesus spanius* are omitted, as we have no larvæ of these species.

DEINOCERITES CANCER Theobald.

Deinocerites cancer Theobald, Mon. Culic., ii, 215, 1901.
Brachiomyia magna Theobald, Mon. Culic., ii, 344, 1901.
Deinocerites cancer Theobald, Mon. Culic., ii, 356, 1901.
Deinokerides cancer Giles, Gnats or Mosq., 2 ed., 472, 1902.
Brachiomyia magna Giles, Gnats or Mosq., 2 ed., 474, 1902.
Deinocerites cancer Theobald, Mon. Culic., iii, 276, 1903.
Deinocerites cancer Wesché, Journ. Roy. Micros. Soc., 35, 1904.
Deinocerites cancer Pazos, Bull. Soc. Ent. France, 1904, 135, 1904.
Deinocerites cancer Dyar, Journ. N. Y. Ent. Soc., xiii, 27, 53, 108, 1905.
Dinocerites cancer Blanchard, Les Moustiques, 414, 1905.
Dinocerites magnus Blanchard, Les Moustiques, 414, 1905.
Deinocerites cancer Theobald, Gen. Ins., Dipt., fasc. 26, 37, 1905.
Deinocerites magna Theobald, Gen. Ins., Dipt., fasc. 26, 37, 1905.
Deinocerites cancer Dyar, Proc. Ent. Soc. Wash., vii, 49, 1905.
Deinocerites cancer Felt, N. Y. State Mus., Bull. 97, 491, 1905.
Deinocerites cancer Theobald & Grabham, Mosq. or Culic. Jamaica, 35, 1905.
Deinocerites cancer Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 188, 1906.
Deinocerites cancer Mitchell, Psyche, xiii, 19, 1906.
Deinocerites cancer Knab (in part), Psyche, xiii, 95, 131, 1906.
Deinocerites cancer Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 26, 1906.
Deinocerites cancer Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Deinocerites cancer Pazos, San. y Ben., ii, 50, 563, 1909.
Deinocerites cancer Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 261, fig. 56, 1909.
Deinocerites cancer Theobald. Mon. Culic., v, 553, 1910.

Digitized by Google

ORIGINAL DESCRIPTION OF DEINOCRITES CANCER:

Thorax blackish, brown towards the scutellum, with scattered bronzy-black scales. Abdomen blackish-brown, with deep umber-brown scales; venter paler. Legs brown with bronzy reflections; coxæ pallid; femora yellowish at the base and underneath. Ungues of the female equal and simple.

♀. Head blackish-brown, with greyish flat curved scales, somewhat creamy coloured towards the front, with scattered brown forked upright scales; antennæ bright brown, basal joint yellowish, base of the second joint the same, fourteen jointed, *second joint very long;* palpi covered with chocolate-brown scales; clypeus bright chestnut-brown; proboscis blackish-brown, darkened and expanding towards the tip, paler at the base; eyes deep purplish-black.

Thorax black, brown towards the scutellum in some specimens, with scattered curved flat bronzy-black scales, with deep chestnut-brown to black bristles; two rows of bristles down the dorsum of the mesonotum; scutellum brown, with dark scales and chestnut-brown to black bristles; metanotum deep purplish-black; pleuræ chestnut-brown.

Abdomen steely-black, entirely covered with umber-brown and dark brown scales, the posterior borders of the segments with small golden-brown bristles; venter brown, thickly clothed with paler scales. When held in some lights the abdomen has an ochraceous tinge in parts.

Legs covered with brown scales, which give them bronzy-yellow reflections in some lights; coxæ pale, with a row of long bristles above each; femora beneath deep yellowish-brown; hind metatarsi a little shorter than hind tibiæ. Ungues equal and simple, fore and mid rather long, hind small.

Wings with brown scales, those on the second long vein and its fork clavate, those on the remainder rather more truncated and with lateral long club-shaped ones in addition, except on the stem of the fourth and base of the fifth veins; first submarginal cell longer but about the same width as the second posterior cell, the cell two and a half times the length of the stem, its base nearer the base of wing than that of the second posterior cell; stem of the second posterior cell much longer than that of the former cell, about two-thirds the length of the cell; posterior cross-vein longer than the mid cross-vein, about one and a fourth times its own length distant from it.

Halteres with deep ochraceous stem and blackish knob.

Length.—3.5 to 4.2 mm.

Habitat.—Jamaica (Dr. Grabham, 8. 2. 1900, 24. 11. 1899); St. Lucia (Otto Galgey, 21. 12. and St. George Gray, 19. 7. 1899). (⊙ & Gl.)

Time of capture.—St. Lucia in July and November; Jamaica in October.

Observations.—Dr. Grabham sends a few ♀'s of this species from Jamaica, with the following note. "Crab-hole form along the sea-coast; the water in the holes is brackish."

A rather obscure species which seems to be abundant in the West Indies, evidently appearing at dusk, as Mr. Galgey places the time of capture 7 P. M. on his labels. Dr. Grabham bred this species from larvæ from pools along the Spanish Town Road and crab-holes near the seashore. It is the prevalent form during the rainy season, and is very abundant at Kingston, Jamaica.

The structural peculiarity of the antennæ in having the greatly elongated second joint is taken as the distinguishing feature of the new genus, in which I propose to place this species.

ORIGINAL DESCRIPTION OF BRACHIOMYIA MAGNA:

Brown; thorax rather shiny; abdomen unbanded, paler beneath; legs rather long and thick, unbanded; antennæ considerably longer than the body.

♀. Head brown with narrow, grey, curved scales, all pointing forwards, with numerous upright, ochraceous, forked scales, rather broad and crenulated at the summit; two black bristles projecting between the eyes and several overhanging them; eyes deep purplish black; clypeus fawn-coloured, nude; proboscis brown, moderately long, prominently curved downwards; antennæ very long and filiform, longer than the whole body, brown, basal joint bright ochraceous, second to fifth joints covered with small brown scales, especially thick towards their base, the second joint long, the following gradually becoming shorter towards the apex. Palpi short, 4-jointed, covered with brown scales, the basal joints the smallest, a few black hairs also on the joints.

Thorax shiny brown, with sparse, narrow, curved, small, greyish-brown scales and short deep-brown bristles; scutellum chestnut-brown with narrow, curved, greyish-brown scales; metanotum nude, deep brown, except at the base, where it is chestnut-brown; pleuræ pale ochraceous, with pale brown mottling and black bristles.

Digitized by Google

Abdomen shiny steely-grey, covered with dull brown scales, which show violet reflections; the last two apical segments have numerous scattered ochraceous scales as well; venter paler, covered with dull ochraceous scales.

Wings with the veins clothed with rather short and moderately thick brown scales, with convex extremities and also with some longer and thinner lateral ones, but not nearly so thin as in *Culex;* first submarginal cell a little longer and narrower than the second posterior cell, their bases about level, stem of the first submarginal nearly half the length of the cell, that of the second posterior cell two-thirds the length of the cell; posterior cross-vein rather more than its own length distant from the mid cross-vein; the sub-costal reaches the border of the wing level with the base of the first submarginal cell; halteres with pale ochraceous stem and fuscous knob.

Legs with the coxæ and trochanters pale ochraceous; fore and mid femora rather thick, posterior femora thinner, brown above, pale ochraceous beneath, a row of bristles on each side, fore, mid, and hind tibiæ brown with a few bristles, metatarsi and tarsi brown; ungues of fore and mid legs equal and simple, rather straight, the mid rather shorter and more curved than the fore ungues (hind ones broken); between the claws is a very distinct and large yellow empodium.

Length.—4.5 mm.

Habitat.—St. Lucia (Low, per Daniels).

Observations.—Described from a single ♀. It is very marked and differs in several respects from any other *Culex*, especially in (i) the long antennæ, (ii) the ungues, and (iii) the swollen fore and mid femora. I have thus placed it in a separate genus, which lies nearest to the *Deinocerites* from Jamaica, and from which differs in the (a) structure of the antennæ, the second to fourth joints being scaly and in the joints gradually shortening to the apex, (b) in the structure of the ungues and in the swollen fore and mid femora, which are of normal size in *Deinocerites*.

A number of fresh specimens have been received since this description was drawn up.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF DEINOCERITES CANCER:

Female.—Proboscis rather long, scarcely thickened towards apex; labellæ rather large, conical; setæ rather long, dense, those on the labellæ more prominently outstanding; vestiture of dark-brown scales. Palpi short, about one-sixth as long as proboscis, brown scaled, with outstanding setæ. Antennæ long, filiform, very slender, second joint about fourteen times as long as wide, the succeeding ones about six times as long as wide, subequal; tori subspherical, with a cup-shaped apical excavation, luteous brown, darker within; hairs of whorls sparse, short, black. Clypeus elliptical, prominent, conical, brown, nude. Eyes broadly contiguous above, black. Occiput clothed with narrow, curved golden-brown scales, paler, broader and denser along margin of eyes, pale, broad and flat on the cheeks; numerous erect, forked brown ones forming a dense mass on the nape; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with black bristles. Mesonotum clothed with narrow, curved golden-brown scales; a pair of bare subdorsal stripes, rather narrow and close together; setæ abundant, long, coarse, arranged in broad subdorsal and marginal rows, longest posteriorly. Scutellum trilobate, clothed with golden-brown scales, each lobe with a group of coarse black setæ. Postnotum rather narrow, with median carina, elongate, brown, smooth. Pleuræ and coxæ luteous brown, with a vertical patch of bronzy-brown scales on the mesopleura and rows of rather coarse dark bristles.

Abdomen subcylindrical, tapering slightly, blunt at apex, the cerci large, subconical, each with a pair of flattened terminal filaments; last segment of abdomen tubercularly roughened on lower surface, with long coarse setæ; vestiture above of dull-brown scales with bronzy and blue luster, beneath dull yellowish, submetallic; setæ numerous, those on hind margins of segments coarser; first segment with numerous pale hairs dorsally.

Wings rather broad, hyaline; petiole of second marginal cell about one-half as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; scales of

Digitized by Google

veins narrowly ovate to ligulate, a few with subtruncate apices, densest and broadest on forks of second vein; bronzy brown, with blue reflection along costa. Halteres pale with brown knobs.

Legs long and slender, the middle femora slightly stouter than the others; vestiture of bronzy-brown scales, with a blue reflection in some lights; femora yellowish beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Male.—Proboscis moderately long and slender, uniform, a suture near the middle, the scales before it roughened. Antennæ very long, exceeding the body in length; second joint fourteen times as long as wide, third joint about eight times as long as wide, the succeeding ones progressively shorter, the penultimate one about four times as long as wide, the last joint thickened, about twice as long as wide. Hairs of whorls sparse, shorter than in the female, obscured by the coarse ciliation. Palpi very short, about one-seventh as long as proboscis. Coloration as in the female. Wings much as in the female, the stems of the fork-cells about the same. Abdomen subcylindrical, somewhat enlarged apically, more hairy than in the female. Claw formula, 1.0–1.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 8, fig. 52): Side-pieces over twice as long as wide, stout, a rounded conical apical lobe on the inner angle bearing fine setæ, a prominence at middle of inner margin bearing two short stout bladders and a stout rod. Clasp segment small, stout, and chitinized like the side-pieces, constricted near base, enlarged apically, and bearing two stout equal terminal claws, outer aspect densely clothed with fine hairs. Harpes broad, rounded, terminal margin furnished with a row of about sixteen stout, fine even teeth. Harpagones divided into three parts, the middle one with a row of fine sharp teeth inwardly, the inner one with the tips pointed and curved inward, not as long as the harpes; outer portion very long, broad at base, tip spatulate, reaching beyond the lateral process of side-piece, smooth. Unci forming a basal cone, the tips divided into teeth.

Larva, Stage IV (see the figure of the entire larva, plate 48).—Head round, nearly circular from dorsal view, a delicate angular process at side from beneath, a shallow notch at insertion of antennæ, front margin broadly arcuate. Antennæ cylindrical, sparsely spined, a tuft at middle; two spines shortly subapical, two spines and a digit at tip. Eyes very small, rounded. Upper dorsal tufts triple, lower double, ante-antennal tuft multiple. Mental plate membranous, triangular, a central tooth and five on each side, very long and slender, the last two with an apical hair-tuft, the last tooth short. Mandible with a long curved basal process outwardly, bearing a tuft of coarse hairs at tip and fitting into the lobe on underside of head; three filaments before tip; an outer row of cilia from a collar; a row of short spines on the outer edge; dentition reduced, a slender trifid prominence, the basal tooth short and truncate; a slender filament and some hairs within; process below long and slender, curved downward, with two patches of hair; edge strongly emarginate below, with three stout hairs; basal angle small but sharp; a row of stout hairs at base. Maxilla elongate, divided by a band-shaped suture; inner half coarsely hairy, except toward the suture; a tuft of long hairs at tip; outer half with small filaments near the suture preceded by a group of hairs. Palpus small, tapering to tip, with moderately long terminal digits. Thorax small, wider than long, the hairs abundant and long. Abdomen moderate, anterior segments slightly shorter, seventh segment long; lateral hairs multiple on first segment, double on second to fifth, single on sixth, longer posteriorly, longest on sixth. Tracheal tubes broad, band-shaped. Air-tube stout, tapered on outer half, four times as long as wide; a tuft of two hairs at

Digitized by Google

middle; pecten of five teeth sparsely scattered to near middle; single tooth furcate, the two branches of nearly equal length. Lateral comb of eighth segment a large patch of spines; single spine with expanded tip, feathered at apex with a row of subequal spinules. Anal segment longer than wide, with a very weak dorsal plate; dorsal tuft a long hair and brush on each side; a small lateral hair; ventral brush well developed, with small tufts preceding. Anal gills absent, represented by a single low, broad prominence.

The larvæ inhabit crab-holes near the sea which are filled with brackish water. The eggs are apparently laid singly on the sides of the holes and the dry season is probably passed in this state. The acces of water causes the eggs to hatch. The adults frequent the upper parts of the crab-holes above the water and do not wander far from these situations. Dr. M. Grabham has found *Culex janitor* associated with these larvæ in crab-holes in Jamaica. Dr. Dyar obtained a few larvæ in southern Florida from a crab-hole that had been filled with salt water from some dredging operations. The other holes were dry and the species at the time evidently in a state of hibernation. Dr. Grabham states that the species feeds only at night and is "a voracious bloodsucker." On the other hand, Dr. Low, as quoted by Theobald, "could never get them to bite," and our observations on other species of the genus correspond with this latter opinion. We think it probable that the species does not bite man, although this should be investigated further. In a large series of captured specimens before us none show traces of blood in the stomach. In the account of this species in the Culicidæ of Jamaica, Theobald and Grabham make no mention of the biting habits. They say:

"This is a 'crab-hole' breeding form, the water in which they occur being brackish. The larvæ occur at the bottom of these crab-holes, near the sea. The crab-holes are long winding passages, sometimes three or four feet long and only about four inches in diameter. The live insects hold their long antennæ stiffly out in front, somewhat arched downwards and kept in constant movement exploring the surface as the insect crawls. . . . They are sluggish in flight, and, when disturbed, Dr. Low noticed that they fly slowly from one hole to another. . . ."

Littoral of the West Indian Islands and southern Florida.

Near Kingston, Jamaica (M. Grabham); Mariel, Cuba, July 8, 1905 (J. W. Taylor); Mariel, Cuba (J. H. Pazos); near Santo Domingo City, Santo Domingo, August, 1905 (A. Busck); Santo Domingo City, from mudhole near houses and river, December, 1905 (F. E. Campbell); Samaria, Santo Domingo, December, 1905 (F. E. Campbell); Barbados, July, 1905 (A. Busck); Guadeloupe, July, 1905 (A. Busck); opposite Miami, Florida, April, 1905 (Dyar & Caudell).

The species is also reported from Santa Lucia and St. Vincent (Theobald); specimens reported from British Guiana by Theobald are probably not this species.

This species was first described under the name *Deinocerites cancer* from female specimens, with which were wrongly associated males of *Culex janitor*. Later the true male was discovered but was supposed to be a female on account of the peculiar simple antennæ, and was described as a new genus and species under the name *Brachiomyia magna*. Theobald and Blanchard later recognized the synonymy of the genera *Deinocerites* and *Brachiomyia*, but held the species distinct. We have been able to recognize several distinct species of *Deinocerites;* but these two, described from the same faunal region, are undoubtedly the same.

Digitized by Google

DEINOCERITES TROGLODYTUS Dyar & Knab.

Deinocerites troglodytus Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 260, 1909.

ORIGINAL DESCRIPTION OF DEINOCERITES TROGLODYTUS:

Closely allied to *D. cancer* Theobald and of the same size and coloration, but the cerci of the female are sharply pointed and have a spine on the lower side, and are not elongate conical as in *D. cancer*, or stoutly conical as in *D. melanophylum* D. & K., while the antennæ of the male are stout at the tip and uniform, the last joint not disproportionately enlarged, not uniformly slender as in *D. melanophylum*, nor with the last joint enlarged like a knob, as in *D. cancer*.

Twenty specimens, Trinidad, British West Indies, June (A. Busck).

Type no. 12128, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF DEINOCERITES TROGLODYTUS:

Female.—Proboscis rather long, scarcely thickened towards apex; labellæ rather large, conical; setæ rather long, dense, those on labellæ more prominently outstanding; vestiture of blackish-brown scales. Palpi short, about one-sixth as long as proboscis, brown scaled with outstanding setæ. Antennæ long, filiform, very slender, coarsely ciliate, second joint about fourteen times as long as wide; succeeding ones about six times as long as wide, subequal; tori subspherical with a cup-shaped apical excavation, luteous brown, darker within; hairs of whorls sparse, short, black. Clypeus elliptical, prominent, conical, light brown, nude. Eyes broadly contiguous above, black. Occiput clothed with narrow, curved golden-brown scales, those on margins of eyes paler, broader and denser; numerous erect, forked brown ones forming a dense mass posteriorly; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with black bristles. Mesonotum clothed with small narrow-curved bronzy-brown scales; a pair of bare submedian stripes, rather narrow and close together; setæ abundant, long, coarse, arranged in broad subdorsal and marginal rows, longest posteriorly. Scutellum trilobate, clothed with bronzy-brown scales, each lobe with a group of coarse black setæ. Postnotum rather narrow, elongate, with median carina, brown, smooth. Pleuræ and coxæ luteous brown, with a vertical patch of bronzy-brown scales on mesopleura and rows of rather coarse dark bristles.

Abdomen subcylindrical, truncate at apex, the cerci large, subconical, obliquely subtruncate at tips, each with a pair of flattened subterminal filaments, one below the other, and a seta below beyond the middle, last segment of abdomen tubercularly roughened apically on the lower surface, with coarse setæ; vestiture above of dull-brown scales with bronzy and blue luster, beneath dull yellowish, submetallic; setæ numerous, those on hind margins of the segments coarser.

Wings rather broad, hyaline; petiole of second marginal cell less than one-half as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; scales of veins ligulate, a few with subtruncate apices, densest and broadest on forks of second vein; bronzy brown, with blue reflection along the costa. Halteres pale with black knobs.

Legs moderately long and slender, the middle femora slightly stouter than the others; vestiture of bronzy-brown scales, with a blue reflection in some lights; femora yellowish beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Male.—Proboscis moderately long and slender, with a suture beyond middle. Antennæ very long, exceeding the body in length; second joint about eighteen times as long as wide, third joint about ten times as long as wide, succeeding ones progressively shorter, penultimate one about three times as long as wide, last joint about the same, but slightly stouter; hairs of whorls sparse, moderate, smaller than in the female, obscured by the coarse ciliation. Palpi very short,

Digitized by Google

about one-seventh as long as proboscis. Coloration as in the female. Wings much as in the female, slightly narrower, the stems of the fork-cells about the same. Abdomen subcylindrical, somewhat enlarged apically, more hairy than in the female. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 8, fig. 50): Side-pieces over twice as long as wide, stout, a rounded, conical, apical lobe on the inner angle, bearing fine setæ; a notch at middle of inner margin bearing two very stout blunt teeth and a stout spine within a rounded prominence. Clasp segment small, stout, and chitinized like the side-pieces, constricted near base, swollen apically, and bearing two equal terminal claws in an apical notch, outer aspect densely clothed with fine hairs. Harpes broad, rounded, outer margin furnished with a row of about fourteen stout, fine even teeth. Harpagones divided into three portions, middle one with a row of long teeth within, surrounding the middle portion, which has the tips pointed and curved inward, not as long as the harpes; outer portion very long, broad, tip rounded, reaching nearly to lateral teeth of side-piece, smooth.

Larva, Stage IV (plate 95, fig. 310).—Head rounded, an angular, laterally projecting lobe beneath to cover the prolongation of mandible; antennæ rather long and slender, uniform, a small hair-tuft at middle; upper head-hairs in fours, lower long and single, ante-antennal tuft multiple. Lateral abdominal hairs in fours on first segment, in twos on second to fifth, single on sixth; lateral comb of eighth segment of many spines in a large triangular patch. Air-tube five times as long as wide, slightly tapering outwardly; pecten of five to seven teeth sparsely set, reaching nearly over basal half of tube, a two-haired tuft beyond, a small hair towards apex and another on dorsal aspect. Anal segment longer than wide, a rounded, illy defined dorsal plate, finely spinose on its lower posterior half; a small ventral plate; dorsal tuft of a long hair and multiple tuft on each side; lateral hair small, single; ventral brush on a raised barred area, bordered laterally by a narrow plate. Anal gills two, very short and rounded.

The larvæ live in the water in crab-holes along the shore, and the adults rest in the upper parts of the holes. Mr. Busck says: "Hole in mangrove swamp dug out after many vain efforts. It was about three feet deep. The adults were clinging in masses in the hole." Mr. Busck, who has had many opportunities to observe *Deinocerites* in the West Indies, has found that the species swarms in the morning twilight as well as in the evening. As with other mosquitoes, the swarming indicates the time of sexual activity and Mr. Busck has frequently noted copulation at such times. He is quite positive that the species does not molest man. In Trinidad numerous crab-holes, each with a swarm of *Deinocerites*, are found in the immediate vicinity of the houses—often within a few feet. Still, these mosquitoes never enter the house, nor is anyone ever bitten by them. Perhaps the larvæ even serve a useful purpose in preventing the water in the crab-holes from becoming offensive.

Trinidad and Martinique, West Indies.

Cedros, Trinidad, June, 1905 (A. Busck); Fort de France, Martinique, July, 1905 (A. Busck).

The specimens reported by Theobald (Mon. Culic., iii, 279, 1903) from British Guiana probably belong to this species, although referred to *Deinocerites cancer*.

DEINOCERITES MELANOPHYLUM Dyar & Knab.

Deinocerites melanophylum **Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 200, 1907.**
Deinocerites melanophylum **Busck, Smiths. Misc. Colls., quart. iss., iii, 60, 1908.**

Original Description of Deinocerites melanophylum:

A local race of *Deinocerites cancer* Theobald, differing by its very dark, almost black color; the clypeus and tori, which in the type form are yellow or yellowish brown, are here dark brown; the mesonotum is pitchy brown, the scales black

Digitized by Google

with brownish luster, the metanotum is pitchy brown, nearly black; the abdomen is black-scaled above and beneath; in the male with blue and green iridescence. The legs are black.

Nine specimens, Colon, Canal Zone, Panama (August Busck, collector), from larvæ in crab-holes near the ocean.

Type.—No. 10865, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF DEINOCRITES MELANOPHYLUM:

Female.—Proboscis rather long, slightly thickened towards apex; labellæ rather large, conical; setæ rather long, dense, those on labellæ more prominently outstanding; vestiture of bronzy-black scales. Palpi short, about one-sixth as long as proboscis, bronzy black scaled, with minute outstanding setæ. Antennæ long, filiform, very slender, coarsely ciliate, second joint about fourteen times as long as wide, succeeding ones about six times as long as wide, subequal; tori subspherical, with a cup-shaped apical excavation, brown, darker within; hairs of whorls sparse, short, black. Clypeus elliptical, prominent, conical, brown, nude. Eyes broadly contiguous above, black. Occiput clothed with narrow, curved bronzy-brown scales, denser and paler on margin of eyes, numerous erect, forked brown ones forming a dense mass posteriorly; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with black bristles. Mesonotum clothed with narrow, curved, dark bronzy-brown scales; a pair of bare subdorsal stripes, rather narrow and close together; setæ abundant, long, coarse, arranged in broad subdorsal and marginal rows, longest posteriorly. Scutellum trilobate, clothed with bronzy-brown scales, each lobe with a group of coarse black setæ. Postnotum rather narrow, convex, dark brown, smooth. Pleuræ and coxæ luteous brown, with a vertical patch of bronzy-brown scales on mesopleuræ and rows of rather coarse dark bristles.

Abdomen subcylindrical, truncate at apex, cerci large, subconical, each with a pair of flattened terminal filaments, the last segment of abdomen tubercularly roughened at tip on the lower surface with long coarse setæ; vestiture above of black scales with dark bronzy and blue luster, beneath dark brown, submetallic bronzy; setæ numerous, those on hind margins of the segments coarser; first abdominal segment with numerous black hairs on the dorsum.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; scales of veins narrowly ovate to ligulate, a few with subtruncate apices, densest and broadest on forks of second vein; bronzy brown with blue reflection along the costa. Halteres pale with black knobs.

Legs long and slender, middle femora slightly stouter than others; vestiture black with bronzy and blue reflection; femora slightly paler beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis moderately long and slender, with a suture beyond the middle. Antennæ very long, exceeding the body in length; second joint about fourteen times as long as wide, third joint about eight times as long as wide, succeeding ones progressively shorter, penultimate one about four times as long as wide, last joint slender and about equal to penultimate; hairs of whorls sparse, moderate, shorter than in the female, obscured by the coarse ciliation. Palpi very short, about one-sixth as long as proboscis. Coloration as in the female. Wings much as in the female, the stems of the fork-cells slightly longer. Abdomen subcylindrical, somewhat enlarged apically, the ciliation coarse, especially towards apex. Claw formula, 1.0–1.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Digitized by Google

Genitalia: Side-pieces over twice as long as wide, stout, a rounded conical apical lobe on the inner angle bearing fine setæ, a notch at middle of inner margin bearing two short, very stout, blunt teeth and a stout spine within a rounded prominence. Clasp segment small, stout, and chitinized like the side-pieces, constricted near base, swollen apically, and bearing two equal terminal claws in an apical notch, outer aspect densely clothed with fine hairs. Harpes broad, rounded, outer margin furnished with a row of about twenty stout, fine even teeth. Harpagones divided into three portions, the middle one with a row of long teeth within, surrounding the middle portion, which has the tips pointed and curved inward, not as long as the harpes; outer portion very long, broad at the base, tip rounded, reaching beyond lateral teeth of side-piece, smooth.

Larva, Stage IV (plate 95, fig. 307).—Head rounded, widest through middle of sides, narrowed behind, a triangular, laterally projecting lobe beneath to cover basal process of mandible; antennæ rather long, slender, a hair-tuft at the middle; upper head-hairs in fours, lower single and very long. Lateral comb of eighth segment of many spines in a large triangular patch. Air-tube about five times as long as wide, slightly uniformly tapering; pecten of six teeth scattered over the basal two-fifths of tube, followed by a long, two-haired tuft; a smaller tuft beyond apical third. Anal segment longer than wide, a rounded dorsal plate, weakly chitinized and with indefinite lateral margin; a smaller but more sharply defined ventral plate between brush and base; dorsal tuft of a long hair and a multiple tuft on each side; lateral hair single; ventral brush large, confined to the barred area. Anal gills in the form of two low, rounded prominences.

The larvæ live in the water in crab-holes and the adults rest in the upper parts of the holes. Mr. Busck says:

"It is identical in life-mode with the West Indian form and is found only near the crab-holes in which the larvæ live. During the day the adults remain within the holes. They come out in a swarm, if a stick is inserted into the hole, but return quickly to their hiding place when left alone. At dusk they come out and swarm above the hole for copulation. Though a few specimens alighted on my hand, which was held close to the hole, when I disturbed the mosquitoes, none attempted to bite, and I do not believe this species ever molests man."

Mr. Jennings found the larvæ associated with *Culex extricator* in crab-holes along the shores, and also in holes from which posts had been withdrawn beside a gravel-dump—"simulated crab-holes."

Panama, Atlantic and Pacific coasts.

Bocas del Toro (W. H. Rosenau); Colon, July 20, 1907, associated with *Culex extricator* (A. Busck); Caldera Island, Porto Bello Bay, March 21 and June 1, 1908 (A. H. Jennings); La Boca, Canal Zone, June 12, 1907 (A. Busck).

DEINOCERITES TETRASPATHUS Dyar & Knab.

Deinocerites tetraspathus Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 260, 1909.

ORIGINAL DESCRIPTION OF DEINOCERITES TETRASPATHUS:

Similar to *D. cancer* Theobald, but the cerci of the female with four terminal flattened appendages instead of two; the appendages are not inserted together, but are approximated towards the tip of the cercus. Second joint of the antennæ about fourteen times as long as wide, the succeeding joints about six times as long as wide and subequal. Coloration as in *D. cancer*.

Two females, Bluefields, Nicaragua, and Puerto Barrios, Guatemala, without date or collector label.

Type no. 12109, U. S. N. M.

DESCRIPTION OF FEMALE OF DEINOCERITES TETRASPATHUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, slightly thickened towards apex; labellæ rather large, conical; setæ rather long, dense, those on labellæ more prominently

Digitized by Google

outstanding; vestiture of brown scales. Palpi short, about one-sixth as long as proboscis, brown scaled, with outstanding setæ. Antennæ long, filiform, very slender, second joint about fourteen times as long as wide, succeeding ones about six times as long as wide, subequal; tori subspherical, with a cup-shaped apical excavation, luteous brown, darker within; hairs of whorls sparse, short, black; ciliation coarse. Clypeus elliptical, prominent, conical, light brown, nude. Eyes broadly contiguous above, black. Occiput clothed with narrow, curved bronzy-brown scales, broader, denser, and paler along margins of eyes, numerous erect, forked brown ones forming a dense mass posteriorly; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with black bristles. Mesonotum clothed with narrow, bronzy golden-brown scales; a pair of bare submetallic stripes, rather narrow and close together; setæ abundant, long, coarse, arranged in broad subdorsal and marginal rows, longest posteriorly. Scutellum trilobate, clothed with bronzy-brown scales, each lobe with a group of coarse black setæ. Postnotum rather narrow, convex, brown, smooth. Pleuræ and coxæ luteous brown, with large ventral patch of bronzy-brown scales on mesopleuræ and rows of rather coarse dark bristles.

Abdomen subcylindrical, truncate at the apex, the cerci large, subconical, each with two flattened filaments, last segment of abdomen tubercularly roughened at tip on lower surface, with coarse setæ; vestiture above of dull-brown scales with faint bronzy and blue luster, beneath slightly paler, submetallic; setæ numerous, those on hind margins of segments coarser; first segment with numerous dark hairs.

Wings rather broad, hyaline; petiole of second marginal cell about one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; scales of veins narrowly ovate to ligulate, a few with subtruncate apices, densest and broadest on forks of second vein, bronzy brown, with blue reflection along the costa. Halteres pale, with black knobs.

Legs long and slender, middle femora stouter than the others; vestiture of bronzy-brown scales with a blue reflection in some lights; femora paler beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Life history and habits unknown.

East coast of Nicaragua, Guatemala, and Honduras.

Bluefields, Nicaragua (————); Puerto Barrios, Guatemala (————); Trapp's Key, British Honduras, March 20, 1909 (W. H. Sligh).

A reëxamination of one of the types, mounted in balsam, shows that the original description is in error in assigning four filaments to the cerci of the female; but two are present. The species, however, while nearly allied to *Deinocerites melanophylum,* is recognizably distinct therefrom.

DEINOCERITES PSEUDES Dyar & Knab.

Deinocerites cancer Knab (in part), Psyche, xiii, 95, 1906.
Deinocerites pseudes Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 260, 1909.

ORIGINAL DESCRIPTION OF DEINOCERITES PSEUDES:

FEMALE.—Antennæ very long, the second joint as long as the next three, the terminal joint not swollen. Proboscis rather long and slender, brown-scaled. Mesonotum dark brown-scaled with numerous coarse black bristles. Metanotum nude. Abdomen compressed apically, blunt, the cerci small, without jointed appendages, vestiture dark above with bronzy luster, yellowish beneath. Legs bronzy brown-scaled, the femora pale beneath nearly to the apex. Claws simple. Length, 4 mm.

MALE.—Antennæ with the third joint slightly shorter than the second, the following joints successively shorter, the last joint with a small knob at the tip, the whorls

Digitized by Google

at the bases of the joints inconspicuous, as small as in the female. Coloration as in the female. Genitalia approximately as in *D. cancer* Theob. Length, 4 mm.

Nine specimens, bred from larvæ in crab-holes, Ancon, Canal Zone, Panama (A. H. Jennings).

Type no. 12053, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF DEINOCERITES PSEUDES:

Female.—Proboscis rather long, slightly thickened towards apex; labellæ rather large, conical; setæ rather long, dense, those on labellæ more prominently outstanding; vestiture of brownish-black scales with slight luster. Antennæ long, filiform, very slender, second joint about fourteen times as long as wide, the succeeding ones about five times as long as wide, subequal; tori subspherical, with a cup-shaped apical excavation, luteous brown, darker within; hairs of whorls sparse, short, black; ciliation coarse. Clypeus elliptical, prominent, conical, brown, nude. Eyes broadly contiguous above, black. Occiput clothed with narrow, curved, pale bronzy-brown scales, those on margins of eyes paler and denser; numerous erect, forked pale brown ones forming a dense mass on the nape; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with black bristles. Mesonotum clothed with narrow, curved bronzy-brown scales; a pair of bare subdorsal stripes, rather narrow and close together; setæ abundant, long, coarse, arranged in broad subdorsal and marginal rows, longest posteriorly. Scutellum trilobate, clothed with bronzy-brown scales, each lobe with a group of coarse black setæ. Postnotum rather narrow, convex, dark brown, smooth. Pleuræ and coxæ luteous brown, with a vertical patch of bronzy-brown scales on mesopleuræ and rows of rather coarse black bristles.

Abdomen subcylindrical, blunt at apex; cerci moderate, subconical, without terminal filaments and with many fine hairs; last segment of abdomen densely pilose on the lower surface posteriorly; vestiture above of dull blackish scales, with bronzy and blue luster, beneath dull yellowish, submetallic; setæ numerous, those on hind margins of the segments coarser; first segment with numerous brown hairs dorsally.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins narrowly ovate to ligulate, a few with subtruncate apices, densest and broadest on forks of second vein, bronzy brown, with blue reflection along the costa. Halteres pale with black knobs.

Legs long and slender, the middle femora stouter than the others; vestiture of black scales, with a bronzy or blue reflection in some lights; femora paler beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Male.—Proboscis moderately long and slender, with a suture well beyond the middle, part beyond suture swollen. Antennæ very long, exceeding the body in length; second joint about sixteen times as long as wide, third joint about twelve times as long as wide, succeeding ones progressively shorter, penultimate one about five times as long as wide, last joint slightly thicker and shorter; hairs of whorls sparse, shorter than in the female, with scattered longer setæ on the shaft. Palpi very short, about one-sixth as long as proboscis. Coloration as in the female. Wings slightly narrower than in the female, the stems of the fork-cells longer. Abdomen subcylindrical, somewhat enlarged apically, the ciliation coarser than in the female especially apically. Claw formula, 0.0–0.0–0.0.

Length: Body about 5.5 mm.; wing 4.5 mm.

Genitalia (plate 8, fig. 51): Side-pieces over twice as long as wide, stout, a rounded, conical apical lobe on inner angle bearing fine setæ, prominence at

Digitized by Google

middle of inner margin bearing two short, very stout, blunt teeth and a stout spine. Clasp segment small, stout and chitinized like the side-pieces, constricted near base, swollen apically, and bearing one stout and one smaller terminal claw in an apical notch, outer aspect densely clothed with fine hairs. Harpes broad, rounded, terminal margin furnished with a row of about twenty stout, fine even teeth, the stem narrowed. Harpagones divided, with three portions, middle sheath-like, with a row of fine teeth within; inner with the tips pointed and curved inward, not so long as the harpes; outer portion very long, broad at base, tip rounded, reaching nearly to lateral teeth of side-piece, smooth. Unci forming a broad, truncate basal cone.

Larva, Stage IV (plate 95, fig. 308).—Head rounded, somewhat angular in outline, with a lobe projecting laterally from beneath to cover basal prolongation of mandible; antennæ rather long and slender, uniform, a tuft at middle; upper head-hairs in fours, lower long and single, ante-antennal tuft multiple. Lateral comb of eighth segment of many spines in a large triangular patch. Air-tube five times as long as wide, slightly tapering on outer half; pecten of five coarse teeth on basal third of tube; a three-haired tuft at middle; a small tuft near apex and a single hair on dorsal aspect. Anal segment longer than wide, with an illy defined dorsal plate; an oblique lateral patch of scale-shaped spines, becoming sharper on posterior margin; a small ventral plate between the brush and the base; lateral tuft small, four-haired; ventral brush large, on a raised barred area, with a small lateral bordering plate; anal gills in form of two low rounded prominences.

The larvæ live in crab-holes in mangrove swamps situated back along the inlets. The water is brackish, sometimes near the surface of the holes, sometimes deeper down. Mr. Knab encountered the species far up the mangrove inlets behind Puntarenas. It was established in the holes of a very large and brightly colored species of crab (*Cardisoma crassum* Smith). These crab-holes were near the head of tide-water, above overflow, often a considerable distance from the water, and the water in them must have been very nearly if not quite fresh. In some of these holes on very low ground the water was quite near the surface, and the larvæ, in great numbers and of various sizes, could be seen suspended by the surface film. About Puntarenas, *Deinocerites* appeared to be the only species of mosquito inhabiting the crab-holes.

The imagos likewise inhabit the crab-holes and during the day rest upon the sides of the hole. It takes considerable disturbance to drive them out, and they then fly slowly out of the hole and sometimes to some nearby hole. Usually, however, they alight in the immediate vicinity of their hole, upon the ground or very near it, and after a very short interval fly back into the hole. At twilight the adults may be seen dancing in a small cloud close to the mouth of the crab-hole. In moist wheather the adults have been seen swarming in the latter part of the afternoon over the mouths of the crab-holes. Mr. Jennings found the larvæ at Corozal in a crab-hole on a hillside in a swamp, in a crab-hole on the flat in front of camp at Miraflores, and at Ancon in similar locations, generally near the shore, but sometimes back from it.

Atlantic and Pacific coasts of Mexico and Central America.

Ancon, Canal Zone, Panama, July 13, November 24, 1908 (A. H. Jennings); Miraflores, Canal Zone, Panama, June 15, 1908 (A. H. Jennings); Corozal, Canal Zone, Panama, December 12, 1907 (A. H. Jennings); Rio Aranjuez, near Puntarenas, Costa Rica, September 13, 1905 (F. Knab); Zihuatanejo, State of Guerrero, Mexico (A. Dugès); Vera Cruz, Mexico, on steamer (L. O. Howard); Nautla, State of Vera Cruz, Mexico, May, 1903 (A. Dugès); Las Peñas, Mexico, May 10, 1903 (A. Dugès); Tampico, Mexico (J. Goldberger).

Digitized by Google

This species is closely allied to *Dinomimetes epitedeus*. The cerci of the female are the same, lacking the two terminal filaments of the other species. It differs in the lack of setæ on the postnotum (not a strong character, apparently) and in the proportionate lengths of the joints of the female antennæ. The female of *Dinomimetes epitedeus* has acquired antennæ constructed essentially like those of the male, while that of the *Deinocerites pseudes* retains the usual female type, characteristic of the other species of *Deinocerites*. Our specimens from the east coast of Mexico are smaller and paler than the others, those from Tampico (our northernmost locality) being the smallest, but we have been unable to find any specific differences and consider this a somewhat widely distributed form with slight local variability.

Genus DINANAMESUS Dyar & Knab.

Dinanamesus Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 259, 1909.

The type species of *Dinanamesus* Dyar & Knab is *Dinanamesus spanius* Dyar & Knab.

GENERIC DIAGNOSIS OF ADULT:

Palpi short in both sexes. Antennæ long and slender, similar in the sexes, the female with second joint about eight times as long as wide, third and fourth together longer than second, last joint slender; of the male the second joint about nine times as long as wide, the third nearly as long as the second, the succeeding joints subequal, the terminal joint enlarged into a slight knob; hairs of whorls rather short and sparse in both sexes, slightly longer in the male than in the female. Prothoracic lobes remote dorsally. Mesonotum with longitudinal rows of coarse setæ. Postnotum nude. Abdomen of female compressed, truncate at tip; that of male somewhat expanded at tip, with stout claspers. Legs rather long and slender, the claws simple in the female.

No larvæ are known in this genus.

The larvæ live in the water in holes formed by certain species of crabs along the coast; we have no specimens as yet. The adults inhabit the upper part of the crab-holes.

Panama.

The genus *Dinanamesus*, while clearly belonging to the deinoceritines, exhibits a transition toward the culicine forms. It is probably the lowest, least specialized, member of the group, in which the peculiar adaptations of the antennæ are but slightly developed. These crab-hole inhabiting species possess peculiarly developed antennæ in order, as we suppose, to enable them to detect the approach of their crustacean host and fly out of the holes before being overwhelmed in the water in the bottom by the incursion of the crab, whose body must completely fill the entrance to the hole. Other mosquitoes inhabiting these holes, such as *Culex latisquama*, have similarly modified antennæ, although in a much less degree, evidently exhibiting a common adaptation to a common need.

But a single species is known.

DINANAMESUS SPANIUS Dyar & Knab.

Dinanamesus spanius Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 259, 1909.

ORIGINAL DESCRIPTION OF DINANAMESUS SPANIUS:

FEMALE.—Proboscis rather long and stout, black-scaled. Occiput dark-scaled, the margins of the eyes white. Mesonotum brown-scaled, with numerous coarse dark bristles, particularly in the antescutellar region and at the bases of the wings. Abdomen somewhat compressed towards the tip, blunt, the cerci small, vestiture above brown with bronzy luster, beneath paler; tip of the abdomen coarsely hairy. Wings hyaline, the scales of the veins brown, long, narrowly ovate to ligulate; those of the costa with a strong bronzy luster. Legs with the tibiæ rather short and stout,

Digitized by Google

bronzy brown-scaled above, pale-scaled beneath to near the apex. Tibiæ and tarsi uniformly bronzy brown-scaled. Claws simple. Length, 2.5 mm.

MALE.—Antennæ much longer than in the female, the hairs of the whorls slightly longer. Proboscis longer, slightly enlarged towards the apex. Abdomen compressed basally, enlarged towards the tip, the claspers large and stout. Coloration as in the female; claws of the fore and middle legs equal, one claw with a long basal tooth. Length, 2 mm.

Two specimens, bred from larvæ in crab-holes, Corozal, Canal Zone, Panama, and Coscojar River, Porto Bello Bay, Panama (A. H. Jennings).

Type no. 12052, U. S. N. M.

This genus is allied to *Deinocerites*, differing in the reduced length of the second antennal joint. It is a more ancestral form in this respect.

DESCRIPTION OF FEMALE AND MALE OF DINANAMESUS SPANIUS (LARVA UNKNOWN):

Female.—Proboscis moderate, swollen at apex; vestiture black, with a bronzy reflection; setæ small, black, dense towards apex, those on labellæ more prominently outstanding. Palpi short, one-seventh as long as proboscis, clothed with bronzy scales and with a few outstanding brown setæ. Clypeus rounded triangular, blackish, nude. Eyes black. Antennæ rather long, with coarse pubescence, hairs of whorls moderate; tori subspherical, with a cup-shaped apical excavation, luteous brown, darker within; second joint long, cylindrical, about eight times as long as wide, nearly twice as long as the third joint, the succeeding joints gradually shorter. Occiput blackish, clothed with narrow, curved bronzy-brown scales on the vertex, sides and margin of eyes with broader pale scales with metallic luster; many erect, broadly wedge-shaped light bronzy-brown scales with shallowly emarginate tips on vertex; a row of black bristles along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, small, clothed with broad, flat bronzy-brown scales and black bristles. Mesonotum dark brown, a pair of narrow impressed bare lines on the anterior half; vestiture of rather coarse, narrow, curved bronzy-brown scales and with subdorsal rows of sparse, very long and coarse brown setæ, most abundant anteriorly and on posterior half. Scutellum trilobate, the mid lobe greatly produced, three times as long as the side lobes, vestiture similar to that of mesonotum, each lobe with a group of black bristles. Postnotum elliptical, prominent, with a median ridge, dark brown, nude. Pleuræ and coxæ blackish brown, with a patch of bronzy-brown scales on mesopleuræ and with rows of brown bristles.

Abdomen subcylindrical, blunt at tip, ends of segments with coarse brown bristles, cerci small, subconical, hairy, the last segment with a fringe of bristles; vestiture dorsally dull brown, beneath paler and with a submetallic luster; first segment with fine brown setæ dorsally.

Wings moderate, hyaline; petiole of second marginal cell about one-third the length of its cell, that of second posterior cell a little longer than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales of veins broadly ligulate, those on forks of second vein somewhat triangularly widened, bronzy brown, with a blue reflection on the costa; fringe ample, of broadly lanceolate scales.

Legs moderate, femora of middle pair broad, flattened; vestiture of bronzy-brown scales, femora with a pale submetallic shade beneath to near apex. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2 mm.

Male.—Proboscis straight, long, slender at the base, gradually but distinctly thickened towards the tip. Antennæ long, without short joints, coarsely pubescent, hairs of whorls sparse, but longer than in female, second to fifth joints with a secondary whorl of shorter hairs near middle; second joint about nine times as long as wide, third joint more than half as long as second, succeeding

Digitized by Google

joints subequal, only slightly diminishing apically, the last joint somewhat thickened. Middle lobe of scutellum less produced than in the female. Abdomen with the last two segments with numerous coarse bristles. Coloration as in the female; wings nearly the same. Claw formula, 1.0–1.0–0.0.

Genitalia (plate 7, fig. 49): Side-pieces over twice as long as wide, the tips rounded, the inner margin forming a setose ridge, which projects roundedly at tip; inner process situated towards the base, slender, bearing two elliptical bladders and a stout spine. Clasp-filament thick and stout, swollen somewhat at the base and middle, one large and one smaller claw inserted at the tip in a notch; outer side of the apical third hairy. Harpes broad, outer margin thickened, inner membranous, weak, and shrunken, tip crowned with a dense row of fine spines. Harpagones divided into 2 plates, outer one long, slender, with a spatulate tip, exceeding the middle of the side-piece; inner lobe of harpago an irregular plate, broad, curled, with teeth on one margin and a rounded, bent point on upper angle. Unci slender, pointed, forming a narrow basal cone.

The larvæ live in the water in crab-holes along the coast. Mr. Jennings obtained them twice in such locations.

Isthmus of Panama.

Corozal, Canal Zone, bred from crab-hole December 11, 1907 (A. H. Jennings); Cascajal River, Porto Bello Bay, May 30, 1908, from crab-hole along the river (A. H. Jennings).

Group CULICINES.

Genus CULEX Linnaeus.

Culex Linnaeus, Syst. Nat., ed. x, 602, 1758.
Culex Fabricius, Systema Entomologiae, 799, 1775.
Culex Fabricius, Mantissa Insectorum, ii, 363, 1787.
Culex Latreille, Précis des caractères génériques des Ins., 153, 1796.
Culex Meigen, Illiger's Mag., ii, 260, 1803.
Culex Latreille, Hist. Nat. Crust. et Ins., xiv, 284, 1805.
Culex Fabricius, Systema Antliatorum, 33, 1805.
Culex Meigen, Syst. Beschr. Eur. Zweifl. Ins., i, 1, 1818.
Culex Robineau-Desvoidy, Mém. Soc. d'hist. nat. Paris, iii, 403, 1827.
Culex Latreille, in Cuvier, Règne Animal, v, 439, 1829.
Culex Walker, Ins. Brit., Dipt., iii, 243, 1856.
Culex Schiner, Fauna Austr., ii, 625, 1864.
Culex Skuse, Proc. Linn. Soc. N. S. Wales, (2), iii, 1724, 1888.
Culex Lynch Arribálzaga (in part), Rev. Mus. de La Plata, i, 373, ii, 157, 1891.
Culex Townsend, Trans. Am. Ent. Soc., xix, 149, 1892.
Culex Ficalbi, Bull. Soc. Ent. Ital., xxviii, 234, 1896.
Culex Ficalbi, Bull. Soc. Ent. Ital., xxxi, 146, 1899.
Culex Howard, U. S. Dept. Agr., Div. Ent., Bull. 25, n. s., 19, 1900.
Culex Giles, Gnats or Mosq., 186, 1900.
Culex Coquillett, U. S. Dept. Agr., Div. Ent., Circular 40, 2 ser., 4, 1900.
Culex Theobald, Journ. Trop. Med., iv, 235, 1901.
Culex Theobald, Mon. Culic., i, 326, 1901.
Aëdes Theobald (in part), Mon. Culic., ii, 224, 1901.
Culex Howard, Mosquitoes, 235, 1901.
Culex Giles, Gnats or Mosq., 2 ed., 335, 386, 1902.
Culex Neveu-Lemaire, C. R. Soc. Biol. Paris, liv, 1331, 1902.
Culex Neveu-Lemaire, Mém. Soc. Zool. Fr., xv, 209, 1902.
Culex Johannsen, N. Y. State Mus., Bull. 68, 411, 1903.
Culex Theobald, Mon. Culic., iii, 157, 1903.
Melanoconops Theobald, Mon. Culic., iii, 178, 1903 (nomen nudum).
Lasioconops Theobald, Mon. Culic., iii, 235, 1903.
Melanoconion Theobald, Mon. Culic., iii, 238, 1903.
Culex Coquillett, Rev. de Med. Trop., iv, 113, 1903.
Culex Sergent & Sergent, Guide prat. étud. des moust., 64, 1903.
Melanoconion Sergent & Sergent, Guide prat. étud. des moust., 66, 1903.

Digitized by Google

Verrallina Theobald (in part), Mon. Culic., iii, 295, 1903.
Heptaphlebomyina Theobald, Mon. Culic., iii, 336, 1903.
Heptaphlebomyia Theobald, Mon. Culic., iii, 336, 1903.
Culicella Felt, N. Y. State Mus., Bull. 79, 391c, 1904.
Ecculex Felt (in part), N. Y. State Mus., Bull. 79, 391c, 1904.
Culex Felt, N. Y. State Mus., Bull. 79, 391d, 1904.
Melanoconion and *Culex* Lutz in Bourroul, Mosq. do Brasil, 60–61, 1904.
Aëdinus Lutz, in Bourroul, Mosq. do Brasil, 54, 1904.
Ædinus Lutz, Imprensa Medica, 1905, 103, 1905.
Culex Lahille, Classif. des Moust., 16, chart, 1904.
Culex and *Melanoconion* Theobald, Mosq. or Culic. of Jamaica, 7, 1905.
Tinolestes Coquillett, Proc. Ent. Soc. Wash., vii, 185, 1905.
Micraedes Coquillett, Proc. Ent. Soc. Wash., vii, 185, 1905.
Neoculex Dyar, Proc. Ent. Soc. Wash., vii, 45, 48, 1905.
Culicella, Culex and *Melanoconion* Dyar, Proc. Ent. Soc. Wash., vii, 45, 48–49, 1905.
Culex, Melanoconion and *Lasioconops* Theobald, Gen. Ins., Dipt., fasc. 26, 15, 1905.
Heptaphlebomyinæ Theobald, Gen. Ins., Dipt., fasc. 26, 41, 1905.
Heptaphlebomyia Theobald, Gen. Ins., Dipt., fasc. 26, 41, 1905.
Gnophodeomyia Theobald, Journ. Econ. Biol., 1, 21, 1905.
Culex Blanchard, Les Moustiques, 153, 267, 1905.
Melanoconium Blanchard, Les Moustiques, 395, 1905.
Aëdinus Blanchard, Les Moustiques, 633, 1905.
Trichopronomyia Theobald, Ann. Mus. Nat. Hungar., iii, 98, 1905.
Culex Felt, N. Y. State Mus., Bull. 97, 482, 1905.
Pseudoheptaphlebomyia Ventrillon, Bull. Mus. Hist. Nat. Paris, 1905, 427, 1905.
Culex Coquillett, Science, n. s., xxiii, 313, 1906.
Grabhamia Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 15, 1906.
Culicella Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 1906.
Culex Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 16, 1906.
Melanoconion Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 16, 1906.
Tinolestes Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 16, 1906.
Micraedes Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 16, 1906.
Culex Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 205, 1906.
Mochlostyrax Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 223, 1906.
Culiciomyia Theobald, Mon. Culic., iv, 227, 1907.
Gnophodeomyia Theobald, Mon. Culic., iv, 251, 1907.
Aporoculex Theobald, Mon. Culic., iv, 150, 316, 1907.
Pseudoculex Theobald, Mon. Culic., iv, 318, 1907.
Culex Theobald, Mon. Culic., iv, 151, 387, 1907.
Leucomyia Theobald, Mon. Culic., iv, 372, 1907.
Microculex Theobald, Mon. Culic., iv, 461, 1907.
Trichopronomyia Theobald, Mon. Culic., iv, 479, 1907.
Melanoconion Theobald, Mon. Culic., iv, 151, 507, 1907.
Oculeomyia Theobald, Mon. Culic., iv, 515, 1907.
Neomelanoconion * Theobald (not Newstead, Dutton & Todd), Mon Culic., iv, 514, 1907.
Heptaphlebomyinæ Theobald, Mon. Culic., iv, 531, 1907.
Heptaphlebomyia Theobald, Mon. Culic., iv, 531, 1907.
Aëdes Theobald (in part), Mon. Culic., iv, 537, 1907.
Culex and *Melanoconion* Howard, Osler's Modern Medicine, i, 372, 1907.
Culex Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Culex Grünberg (in part), Die Blutsaug. Dipt., 96, 1907.
Heptaphlebomyia Grünberg, Die Blutsaug. Dipt., 108, 1907.
Culex Autran (in part), Anal. Dep. Nac. Hig., xiv, 19, 1907.
Culex, Microculex, Melanoconion, and *Neomelanoconion* Peryassú, Os Culicid. do Brazil, 35–36, 1908.
Aedinus Peryassú, Os Culic. do Brazil, 36, 1908.
Culex Williston, Man. No. Am. Dipt. 3 ed., 108, 1908.
Pectinopalpus Theobald, Ann. Mag. Nat. Hist., (8) v, 375, 1910.
Culex Dyar & Knab, Proc. Ent. Soc. Wash., xi, 30, 1909.
Gnophodromyia Theobald, Mon. Culic., v, 114, 1910.
Gnophodeomyia Theobald, Mon. Culic., v, 250, 1910.
Aporoculex Theobald, Mon. Culic., v, 116, 292, 1910.
Leucomyia Theobald (in part), Mon. Culic., v, 116, 311, 1910.
Microculex Theobald, Mon. Culic., v, 116, 400, 1910.

* Newstead, Dutton and Todd (Ann. Trop. Med. and Parasit., i, 31, 1907) published the name *Neomelanoconion* before its publication by Theobald. Their type species is *N. palpale* N., D. & T., unknown to us.

Digitized by Google

Trichopronomyia **Theobald, Mon. Culic., v, 117, 415, 1910.**
Lasioconops **Theobald, Mon. Culic., v, 117, 464, 1910.**
Oculeomyia **Theobald, Mon. Culic., v, 118, 477, 1910.**
Heptaphlebomyinæ Theobald, Mon. Culic., v, 481, 1910.
Heptaphlebomyia **Theobald, Mon. Culic., v, 481, 1910.**
Culiciomyia **Theobald, Mon. Culic., v, 114, 229, 1910.**
Eumelanomyia **Theobald, Mon. Culic., v, 114, 240, 1910.**
Culex **Theobald, Mon. Culic., v, 322, 1910.**
Pectinopalpus **Theobald, Mon. Culic., v, 416, 1910.**
Melanoconion **Theobald, Mon. Culic., v, 455, 1910.**
Neomelanoconion **Theobald, Mon. Culic., v, 458, 1910.**
Micraëdes **Theobald, Mon. Culic., v, 486, 1910.**
Aedinus **Theobald, Mon. Culic., v, 487, 1910.**
Tinolestes **Theobald, Mon. Culic., v, 627, 1910.**
Culex **Edwards, Bull. Ent. Research, ii, 256, 1911.**

The type species are: of *Culex* Linnæus, *Culex pipiens* Linnæus; of *Lasioconops* Theobald, *Lasioconops poicilipes* Theobald; of *Melanoconion* Theobald, *Culex atratus* Theobald; of *Heptaphlebomyia* Theobald, *Heptaphlebomyia simplex* Theobald; of *Culicella* Felt, *Culex dyari* Coquillett; of *Aedinus* Lutz, *Aedinus amazonensis* Lutz; of *Gnophodeomyia* Theobald, *Gnophodeomyia inornata* Theobald; of *Tinolestes* Coquillett, *Tinolestes latisquama* Coquillett; of *Micraedes* Coquillett, *Micraedes bisulcatus* Coquillett; of *Neoculex* Dyar, *Culex territans* Walker; of *Mochlostyrax* Dyar & Knab, *Mochlostyrax caudelli* Dyar & Knab; of *Culiciomyia* Theobald, *Culiciomyia inornata* Theobald; of *Microculex* Theobald, *Microculex argenteoumbrosus* Theobald; of *Neomelanoconion* Theobald, *Culex rima* Theobald; of *Leucomyia* Theobald, *Culex gelidus* Theobald; of *Aporoculex* Theobald, *Aporoculex punctipes* Theobald; of *Pseudoculex* Theobald, *Aporoculex punctipes* Theobald; of *Trichopronomyia* Theobald, *Trichopronomyia annulata* Theobald; of *Oculeomyia* Theobald, *Oculeomyia sarawaki* Theobald; of *Pseudoheptaphlebomyia* Ventrillon, *Pseudoheptaphlebomyia madagascarensis* Ventrillon; of *Eumelanomyia* Theobald, *Eumelanomyia inconspicuosa* Theobald; of *Pectinopalpus* Theobald, *Pectinopalpus fuscus* Theobald.

Generic Diagnosis of Adult:

Palpi short in the female, generally long in the male, occasionally shorter, half as long as the proboscis or even as short as those of the female. Antennal shaft filiform, the joints subequal in the female, with basal whorls of rather sparse hairs on the joints; all but last two joints shortened in the male, with a curved, raised rim bearing the hair-whorls, which are long, dense, appearing plumose. Proboscis varying in length, stout or slender, uniform or enlarged at apex, straight in the male, more or less curved in the female. Prothoracic lobes well separated. Mesonotum with rows of coarse setæ on disk. Scutellum trilobate. Abdomen subcylindrical, truncate at tip in the female, the cerci short and inconspicuous; slightly or not at all expanded at the tip in the male, occasionally depressed, often with dense lateral ciliation. Legs moderate; scraper of hind tibiæ of not more than five teeth; claws equal and simple in female, unequal and some of them toothed in male. Wing of male generally narrower than that of the female, basal cross-vein remote from anterior cross-vein, never incident.

Generic Diagnosis of Larva:

Head rounded, flattened; antennæ large, usually with the tuft large and placed beyond the middle, arising from a distinct notch. Air-tube usually over three times as long as wide, rarely short, always with several scattered hair-tufts or single hairs, rarely reduced to obsolescence; pecten present in two rows at base of tube. Lateral comb of eighth abdominal segment of generally numerous scales in a row or patch. Anal segment completely ringed by a chitinous band in last stage and with well-developed ventral brush. Anal gills variously developed.

Distribution throughout the world, except in the Arctic regions.

The males have the claws of the front and middle legs large and unequal, in the typical forms each with a long slender tooth near its middle. In many forms the lesser claw of these legs appears to be simple, but close examination will in most cases reveal a slender tooth inserted close to base on the inner side. The male palpi in the more typical forms are acuminate and curved upward;

Digitized by Google

in others, particularly the group *Microculex*, the palpi are straight, blunt at apex, and more or less shortened.

The genus *Culex*, as conceived by Linnæus, comprised a very extended group, including besides the Culicidæ as now understood, Simuliidæ, Chironomidæ, and even a dung-inhabiting fly. The first species, *Culex pipiens*, has been uniformly considered to be the type, perhaps because it is the "most common or officinal" species included. By his *Culex pipiens* Linnæus evidently had in mind any mosquito with short palpi in the female, including the genera *Culex*, *Culiseta*, and *Aëdes* as we now know them. To properly apply the name *Culex*, therefore, it is necessary to restrict the species *pipiens* of Linnæus. Now, Linnæus proposed *Culex vulgaris* in 1736 (Act. Ups., 31) and *Culex alpinus* in 1737 (Flora Lapp., 364), but as these names are before the tenth edition of the Systema Naturæ, they are arbitrarily ruled out by the nomenclatorial codes. Their first mention after 1758 is in the second edition of the Fauna Suecica (p. 464, 1761) as synonyms of *Culex pipiens*. Later, however, (Flora Lapponica, 2 ed., 380, 381, 1792), he revives the names and discusses the two species at some length. We infer that his *Culex vulgaris* represents principally a species of *Simulium*, perhaps partly confused with *Culex* (*Aëdes*) and that the *Culex alpinus* represents an *Aëdes*, perhaps the same as *Aëdes nigripes* Zetterstedt. This constituted an elimination from the general *Culex pipiens* conception of Linnæus of the *Aëdes* element, leaving *Culex* (in the present sense) and *Culiseta*. The restriction to the common house mosquito seems to have been generally made on account of Linnæus's own references to Réaumur and others, who seem to have had under observation *Culex pipiens* as here understood. The *Culiseta* appear to be rarer and less domestic and are excluded from consideration as being less "common or officinal." In 1776, De Geer described *Culex communis* (Mém. Hist. Ins. 316, pl. 17, ff. 14–15), which Fabricius referred to the synonymy of *Culex pipiens* (Species Ins., ii, 469, 1781). The larvæ figured by De Geer show his species to have been an *Aëdes*, and this acts as a restriction on the *Culex pipiens* of Linnæus and confirms the opinion above arrived at. Theobald therefore appears to be justified in recognizing as the true *pipiens*, the common house-mosquito of Europe breeding in artificial receptacles. It is altogether possible that there are several species so breeding in Europe—in America we have five along the Atlantic seaboard—but if so they never have been differentiated. We therefore consider as *pipiens* the common rain-barrel inhabiting species of Europe and identify with it that one of our common rain-barrel species which agrees in the male genitalia with the one from Europe.

The genus *Culex*, as treated here, rests essentially on the characters of the larvæ and the male genitalia; it includes forms which differ considerably from the common adult type. Most striking of these more specialized forms are those with the reduced male palpi, for which a number of genera have been proposed (*Micraedes*, *Aedinus*, *Isostomyia*, *Tinolestes*); but there are no supporting characters in the female, larva, or male genitalia that would warrant their separation from *Culex*. In fact, the forms with short male palpi intergrade with the typical forms with long palpi through such species as *Culex ocellatus*, where the male palpi are only slightly shortened; this intergradation doubtlessly will be made more complete by the discovery of other tropical forms, for our knowledge of the neotropical species of *Culex* is as yet very fragmentary. Another specialization, the lengthening of the antennal joints, occurs in *Culex* (*Tinolestes*) *latisquama*, but here again intermediate forms lead up from the general type. The modifications of the scale vestiture, and the genera founded on them, need not be discussed here. It should be pointed out, however, that two other genera, which we have treated as distinct, might, perhaps, with more propriety be treated as subgenera of *Culex*. These are *Lutzia* and *Carrollia*. The close relationship of these genera with *Culex* is obvious, and, in *Lutzia*, the

Digitized by Google

separation rests essentially upon the modification of the larvæ for the predaceous habit, the adults being very feebly differentiated from the *Culex* type. In *Carrollia,* the differentiation has gone farther, both adults and larvæ having acquired a distinctive habitus. On the other hand, the two forms treated here under subgenera of *Culex* (*C. melanurus, C. dyari*) should more properly be excluded and treated as distinct genera. The male genitalia show a much more primitive type, altogether lacking the appendages of the side pieces and the complex modifications of the basal structures. The adults, however, otherwise present no significant characters to separate them from *Culex,* and the larvæ also follow the *Culex* type, so that we feel constrained, against our convictions, to include them with *Culex.*

The larvæ generally inhabit water of a permanent character as opposed to pools of rain-water or snow-water that dry in a few days. The habits of the different species vary greatly. *Culex pipiens* and *C. quinquefasciatus* are fond of foul water and have become semi-domesticated, frequenting the vicinity of man. Man supplies to these species many excellent breeding-places sufficiently foul, and furnishes in his own person an abundant source of food for the adults. No other *Culex* will frequent as foul water as these species, in fact the others generally prefer comparatively clear water, although there are several other species besides *Culex pipiens* that inhabit rain-water barrels and other artificial receptacles as well as drainage-water and open pools in our towns.

The water in tree-holes and between the leaves of bromeliads furnishes suitable breeding-places to some species, especially to a number of tropical forms. Fewer species are confined to such situations than members of other genera; the ground-pools and edges of lakes, swamps, and streams are inhabited by them where there is a sufficient cover of vegetation. Some species are addicted to the holes formed by crabs in mud along the tropical sea-coast.

The eggs are laid in boat-shaped masses, containing 100 or more eggs. These float on the water or remain attached to the edge of the receptacle by capillary action; the larvæ hatch within a few days. Development is fairly rapid. The generations succeed each other continuously as long as the conditions are suitable; when there is a cold season the last adults hibernate and in the fall enter holes, caves, or in the presence of man, sheds or cellars. Many specimens perish during the hibernation period, so that the species are least numerous in individuals immediately after winter, and increase in numbers until unfavorable weather again checks their activity. The adults are crepuscular or nocturnal in habit, many being addicted to a diet in part at least of mammalian or avian blood. The males swarm in the evening and morning about prominent objects, preceding the union of the sexes. The length of life of the males, while not positively determined, is probably of short duration.

Some species of exceptional habits are included in the genus. A number of the species are inhabitants of water between the leaves of bromeliaceous plants, and these have modified larvæ with greatly elongated air-tubes. Their eggs are laid inclosed in a gelatinous capsule, each egg surrounded by its own layer of gum, the whole resembling a mass of frog's eggs. Again, *Culex melanurus* lays its whitish eggs singly on the water-surface, and passes the winter as fully-grown larva. In this case the adults remaining in the fall perish, the species being continued over the winter only by its matured larva. Further, *Culex dyari* passes the winter in the egg state and has but a single brood in the year, exactly like an *Aëdes.* The eggs are probably laid singly. The two last mentioned species are distinctly more primitive in character than the other species as shown especially by the male genitalia.

The genus *Isostomyia* is based upon a species of *Culex,* but nevertheless can not be quoted in the synonymy of this genus. The species which furnished Coquillett the basis for his genus was wrongly supposed by him to be the *Aedes*

Digitized by Google

perturbans of Williston. That species has since been found to belong to the Sabethini, and as the generic name follows its type species, we are compelled to treat *Isostomyia* Coquillett as a sabethine with *Aedes perturbans* Williston as the type, regardless of the material that was before Coquillett and from which he derived the characters of the genus. *Isostomyia,* therefore, will be found in this work among the Sabethini (page 187).

The genera *Lasioconops* Theobald, *Oculeomyia* Theobald, and *Pseudoheptaphlebomyia* Ventrillon are unknown to us, except from the descriptions, which offer nothing tangible. We include them in the synonymy on the authority of F. W. Edwards (Bull. Ent. Research, ii, 256, 1911).

Culex, as treated by most authors, does not constitute a generic unit in the modern sense of the term. This not only applies to the work of the earlier authors, but also to many of the present day. The genus was first restricted in a consistent manner by Felt, in 1905, on the basis of the male genitalia, the heterogeneous forms being transferred to other genera. Shortly afterward Dyar and Knab restricted the genus in a similar manner on larval characters. These authors removed from *Culex* a few aberrant forms, which we now think best to return to the genus. Theobald, in 1907, adopted the restriction by the characters of the male genitalia, but failed to carry it out consistently, including species which belong to other genera. Furthermore, species properly belonging to *Culex,* in the most restricted sense, were scattered by him throughout other genera, or separated into genera of their own on trifling characters. The following table of the adults is based principally on the females, and it should be noted that the proboscis may be white-ringed in the male where this is not the case in the female; the abdominal ornamentation, also, often differs in the two sexes of the same species.

Tables of the Species.

Adults, structure and coloration.

1. Proboscis white-ringed in the female..... 2
   Proboscis at least not completely white-ringed in the female..... 7
2. White rings of the tarsal joints broad..... 3
   White rings of the tarsal joints narrow..... 6
3. Femora and tibiæ marked with a fine white line on the outside, the femur with little white below at the base..... 4
   Femora and tibiæ black without, the femur with much white below at base. 5
4. Scales on forks of second vein long, narrowly ligulate
   tarsalis Coquillett (p. 230)
   Scales on forks of second vein shorter, narrowly lanceolate
   duplicator Dyar & Knab (p. 235)
5. Palpi of the male white at the base of the second and third joints below; female with a few white scales at apices of palpi
   stigmatosoma Dyar (p. 236)
   Palpi of the male marked with white at bases and apices of second and third joints below; female with a white patch at tip of palpi
   cumimetes Dyar & Knab (p. 238)
6. Abdomen with segmental dorsal white patches..... *corniger* Theobald (p. 240)
   Abdomen with basal segmental bands
   hassardii Grabham (see *corniger,* p. 240)
7. Tarsi with white rings at the bases of the joints..... 8
   Tarsi with white or pale rings on both ends of the joints..... 14
   Tarsi without pale rings, unbanded..... 36
8. Hind tarsi with broad white rings; thoracic markings silvery (abdomen of female with or without dorsal segmental white spots)
   imitator Theobald (p. 430)
   Hind tarsal rings narrower; thoracic markings, when present, scarcely silvery 9

Digitized by Google

9. Mesonotum with golden scales on anterior margin; palpi of male all black *daumastocampa* Dyar & Knab (p. 435)
Mesonotum without golden scales anteriorly 10
10. Apices of posterior tibiæ black; palpi of male white-tipped 11
Apices of posterior tibiæ white; palpi of male black 12
11. Tarsal rings very narrow; thorax spotted with black *pleuristriatus* Theobald (p. 437)
Tarsal rings broader; thorax brown, unornamented *consolator* Dyar & Knab (p. 439)
12. Proboscis uniform; all hind tarsi ringed at base 13
Proboscis swollen at tip; hind tarsi ringed at base of first three joints *elocutilis* Dyar & Knab (p. 247)
13. Scales on the forks of the second vein narrow.. *rejector* Dyar & Knab (p. 441)
Scales on the forks of second vein in part ovate. *jenningsi* Dyar & Knab (p. 443)
14. White rings of the tarsi broad, last tarsal joint all white 15
White rings of the tarsi narrow or obscure 17
15. Wing-scales narrow, linear 16
Wing-scales elliptical-ovate; venter of abdomen obscurely pale-banded *taniopus* Dyar & Knab (p. 248)
16. Venter of abdomen distinctly black and white-banded *stenolepis* Dyar & Knab (p. 249)
Venter obscurely pale or dusky-banded.... *pinarocampa* Dyar & Knab (p. 251)
17. Large species; two distinct bare stripes on thorax.... *dyari* Coquillett (p. 457)
Smaller species without distinct bare stripes on thorax 18
18. Tarsal pale rings brown 19
Tarsal pale rings white 22
19. Last joint of hind tarsi dark 20
Last joint of hind tarsi whitish, especially beneath. *annulipes* Theobald (p. 258)
20. Occiput with recumbent pale scales, scattered upright black ones 21
Occiput with a distinct black patch on the side. *carmodyæ* Dyar & Knab (p. 255)
21. Mesonotum bronzy brown ..... *caribeus* Howard, Dyar & Knab (p. 257)
Mesonotum reddish brown ..... *restuans* Theobald (p. 333)
22. Tip of last hind tarsal joint black 23
Tip of last hind tarsal joint at least narrowly white 26
23. Abdomen unbanded dorsally ..... *janitor* Theobald (p. 258)
Abdomen with basal segmental white bands 24
24. Abdomen above dull black 25
Abdomen above coppery black, the basal bands uniform *dictator* Dyar & Knab (p. 266)
25. Basal bands not mesially produced.... { *eremita* Howard, Dyar & Knab (p. 261) / *habilitator* Dyar & Knab (p. 262) }
Basal bands mesially produced ..... *vindicator* Dyar & Knab (p. 264)
26. Abdomen of the female banded uniformly on the segments dorsally 27
Abdomen spotted dorsally or the bands triangularly mesially produced..... 32
Abdomen unbanded dorsally ..... *toweri* Dyar & Knab (p. 281)
27. Abdominal bands white 28
Abdominal bands grayish, submetallic ..... *inquisitor* Dyar & Knab (p. 270)
28. Pleura pale with dark markings 29
Pleura green ..... *declarator* Dyar & Knab (p. 269)
Pleura blackish ..... *lamentator* Dyar & Knab (p. 276)
29. Thoracic vestiture dense, of coarse, narrow curved scales 30
Thoracic vestiture sparse, of minute hair-like scales *eremita* Howard, Dyar & Knab (p. 261)
30. Thorax adorned with markings 31
Thorax uniformly colored ..... *mollis* Dyar & Knab (p. 267)
31. Proboscis short and stout..... *loquaculus* Dyar & Knab (see *corniger* p. 240)
Proboscis long and rather slender..... (see *coronator* p. 286)
32. Abdomen with dorsal spots 33
Abdomen with dorsal bands produced mesially 34
33. Last segment of the abdomen all black ..... *secutor* Theobald (p. 282)
Last segment of the abdomen pale-banded..... *jubilator* Dyar & Knab (p. 272)
34. Tarsal pale rings broader; a pale spot on middle of proboscis below, usually distinct ..... *coronator* Dyar & Knab (p. 286)
Tarsal rings narrower; pale shade on proboscis below faint 35

Digitized by Google

35. Mesonotum dark brown, the scales coppery.... *revelator* Dyar & Knab (p. 274)
Mesonotum light brown, the scales golden brown
proclamator Dyar & Knab (p. 279)
36. Abdomen with apical white segmental bands or spots..... 37
Abdomen without apical bands, the markings, if present, basal..... 38
37. Abdominal bands transverse, uniform..... *territans* Walker (p. 293)
Abdominal bands expanded laterally forming a line
sphinx Howard, Dyar & Knab (p. 301)
Abdominal bands absent, lateral spots present.. *derivator* Dyar & Knab (p. 290)
38. Mesonotum with a lateral black ocellate spot..... *ocellatus* Theobald (p. 446)
Mesonotum not so marked..... 39
39. Palpi of the male very short..... 40
Palpi of the male half as long as the proboscis.. *latisquama* Coquillett (p. 303)
Palpi of the male as long or longer than the proboscis..... 41
40. Abdomen with lateral white spots..... *bisulcatus* Coquillett (p. 306)
Abdomen immaculate, blackish dorsally. { *conservator* Dyar & Knab (p. 308) / *corrigani* Dyar & Knab (p. 386)
41. Thorax golden before..... 42
Thorax not golden before..... 44
42. Scales of the wings narrow..... *chrysonotum* Dyar & Knab (p. 310)
Scales of the wings broad..... 43
43. Anterior half of the thorax golden uniformly..... *spissipes* Theobald (p. 312)
Anterior golden area containing two large, brown-scaled spots
fur Dyar & Knab (p. 314)
44. Thorax red; abdomen with dusky indistinct bands. *erythrothorax* Dyar (p. 315)
Thorax darkly colored, not light red..... 45
45. Proboscis of the female slender, not distinctly swollen at the tip..... 46
Proboscis of the female stout, distinctly swollen at tip..... 67
46. Abdomen unbanded dorsally..... 47
Abdomen more or less distinctly white-banded dorsally..... 56
47. Scales on forks of second vein narrow, linear or ligulate..... 48
Scales on forks of second vein broad and ovate..... 51
48. Abdomen with the venter dull whitish, obscurely banded
extricator Dyar & Knab (p. 325)
Abdomen with the venter distinctly black and white banded..... 49
Abdomen entirely white beneath..... 54
49. Abdomen dull black above..... 50
Abdomen with coppery luster..... *trachycampa* Dyar & Knab (p. 329)
50. Thoracic vestiture brownish black..... *invocator* Dyar & Knab (p. 323)
Thoracic vestiture reddish brown..... *equivocator* Dyar & Knab (p. 327)
51. Scales on occiput narrow, curved..... 52
Scales on occiput broad, flat..... 53
52. Venter gray, not distinctly banded..... *melanurus* Coquillett (p. 453)
Venter black and white banded..... *delys* Howard, Dyar & Knab (p. 317)
53. Venter mostly pale, last segment only dark at tip. *peccator* Dyar & Knab (p. 318)
Venter black with narrow pale basal segmental bands (separable by the ♂ genitalia) ..... { *hesitator* Dyar & Knab (p. 319) / *apateticus* Howard, Dyar & Knab (p. 321)
54. Abdomen dull black above..... 55
Abdomen with coppery luster..... *restrictor* Dyar & Knab (p. 331)
55. Lateral spots of abdomen not visible from above.. *salinarius* Coquillett (p. 373)
Lateral spots visible from above..... *similis* Theobald (p. 339)
56. Band at base of second abdominal segment triangular or triangularly produced 57
This band transverse, not mesially produced..... 63
57. Proboscis white-marked below..... 58
Proboscis not white-marked below..... 59
58. Proboscis black at the tip; thorax adorned
lactator Dyar & Knab (see *corniger*, p. 240)
Proboscis white at tip; thorax unadorned.... *revocator* Dyar & Knab (p. 344)
59. Basal abdominal bands joined to the lateral spots..... 60
Basal abdominal bands separated from the lateral spots..... 62
60. Wing-scales broader; abdomen black-banded below
abominator Dyar & Knab (p. 378)
Wing-scales linear; abdomen unbanded below..... 61

Digitized by Google

61. Scales of the occiput golden brown..... *pipiens* Linnæus (p. 360)
Scales of the occiput whitish..... *comitatus* Dyar & Knab (p. 369)
62. Vestiture of mesonotum deep bronzy brown.... *barbarus* Dyar & Knab (p. 337)
Vestiture of the mesonotum pale brown, frosted. *quinquefasciatus* Say (p. 345)
63. Thorax with narrow curved scales..... 64
Thorax with minute, hair-like scales..... 65
64. Vertex of head with a brown patch on each side; impressed lines of mesonotum rather broad..... *restuans* Theobald (p. 333)
Vertex of head uniformly whitish-scaled; impressed lines of mesonotum narrow ..... *factor* Dyar & Knab (p. 371)
65. Abdominal bands on sixth and seventh segments laterally produced *similis* Theobald (p. 339)
Abdominal bands not so produced..... 66
66. Venter entirely pale beneath..... *salinarius* Coquillett (p. 373)
Venter black and white banded beneath..... *proximus* Dyar & Knab (p. 377)
67. Abdomen unmarked above, without stripes or lateral spots *corrigani* Dyar & Knab (p. 386)
Abdomen with lateral spots, but without dorsal marking..... 68
Abdomen with dorsal basal spots on some of the segments..... 80
Abdomen with pale basal segmental bands dorsally..... 81
68. Occiput entirely dark-scaled..... 69
Occiput pale brown or yellowish-scaled with erect black scales..... 75
Occiput dark-scaled, the eyes margined with whitish..... 76
69. Pleura blackish ..... *leprincei* Dyar & Knab (p. 397)
Pleura pale (whitish, green or brown)..... 70
70. Ventral abdominal bands sordid, narrow..... 71
Ventral abdominal bands clear white, broad..... 72
71. Scales of the veins narrowly ovate, narrow on the upper fork of the fifth vein *inhibitator* Dyar & Knab (p. 391)
Scales of the veins rather broadly ovate, especially on the fork of the fifth vein ..... *elevator* Dyar & Knab (p. 414)
72. Wing-scales narrowly ovate, very long and dense *floridanus* Dyar & Knab (p. 402)
Wing-scales more broadly ovate, shorter and less dense..... 73
73. Abdomen with distinct coppery luster..... 74
Abdomen without marked coppery luster..... { *reductor* Dyar & Knab (p. 399) / *atratus* Theobald (p. 388) }
74. Male with transverse white abdominal bands.... *caudelli* Dyar & Knab (p. 395)
Male without even transverse bands..... *pilosus* Dyar & Knab (p. 393)
75. Scales on the forks of second veins narrow, ligulate { *microsquamosus* Grabham (p. 403) / *inflictus* Theobald (p. 406) }
Scales on the forks of second vein broad, ovate. *ignobilis* Dyar & Knab (p. 390)
76. Venter of abdomen entirely whitish scaled..... *scholasticus* Theobald (p. 407)
Venter of abdomen black-banded, especially posteriorly..... 77
77. Abdomen bronzy above..... 78
Abdomen black above, without bronzy luster..... 79
78. Pleura brown ..... *conspirator* Dyar & Knab (p. 410)
Pleura pale whitish..... *carcinophilus* Dyar & Knab (p. 412)
79. Forks of the second vein with long narrowly ovate scales *deceptor* Dyar & Knab (p. 408)
Forks of the second vein with dense ovate scales *incriminator* Dyar & Knab (p. 409)
80. Mesonotum with large and broad scales..... *erraticus* Dyar & Knab (p. 382)
Mesonotum with small, narrow curved scales.... *agitator* Dyar & Knab (p. 384)
81. Abdomen white beneath..... 82
Abdomen banded beneath..... 87
82. Pleura with dark longitudinal stripes..... 83
Pleura without such stripes..... 84
83. Abdomen bronzy above..... *inimitabilis* Dyar & Knab (p. 449)
Abdomen black above..... *azymus* Dyar & Knab (p. 451)
84. Hind tibiæ whitish beneath..... 85
Hind tibiæ not whitish beneath..... 86

Digitized by Google

85. Mesonotum light golden scaled..... *interrogator* Dyar & Knab (p. 417)
Mesonotum dark brown scaled..... *reflector* Dyar & Knab (p. 419)
86. Scales of occiput and wings narrow..... *palus* Theobald (p. 342)
Scales of occiput mostly broad, of wings elliptical
falsificator Dyar & Knab (p. 425)
87. Vertex of the head with a broad area of narrow curved scales
mutator Dyar & Knab (p. 422)
Vertex of the head with a narrow area of such scales..... 88
88. Eyes with a distinct white margin..... *egberti* Dyar & Knab (p. 421)
Eyes not margined with white..... 89
89. Scales on the fork of second vein short and broad
bastagarius Dyar & Knab (p. 424)
Scales on the fork of the second vein elongated
mastigia Howard, Dyar & Knab (p. 426)

The following species are omitted as the adults are unknown: *mortificator* Dyar & Knab; *simulator* Dyar & Knab; *investigator* Dyar & Knab; *bahamensis* Dyar & Knab; *decorator* Dyar & Knab; *gravitator* Dyar & Knab.

Of the following the adults only are known and the descriptions are insufficient for recognition: *nigripalpus* Theobald (page 428); *subfuscus* Theobald (page 429); *nigricorpus* Theobald (page 322).

ADULTS, MALE GENITALIA.

1. Side-pieces without an outer lobe..... 2
Side-pieces with an outer lobe bearing setæ or appendages..... 3
2. Uncl prominently exserted..... *dyari* Coquillett (p. 459)
Uncl not inserted..... *melanurus* Coquillett (p. 454)
3. Lateral prominence of the side-piece subquadrate, single, usually bearing three or more rods and a leaf-like appendage; inner branch of the harpes usually with a tuft of spines at tip..... 4
Lateral prominence of the side-piece subquadrate, more or less divided into two parts; harpes and harpagones divided into many plates without tufts or comb..... 19
Lateral prominence of the side-piece divided or situated basally; inner branch of the harpes usually in the form of a comb with a slender stem..... 20
4. Inner branch of harpe with a tuft of fine hair; prominence of side-piece with two spatulate filaments and no leaf-like appendage..... 5
Inner branch of harpe with a tuft of spines..... 6
5. Prominence of the side-piece joined to apex by a serrated membrane
territans Walker (p. 295)
Prominence of the side-piece separated from apex
derivator Dyar & Knab (p. 292)
6. Prominence of side-piece slender with two or three rods only
{ *habilitator* Dyar & Knab (p. 263)
{ *eremita* Howard, Dyar & Knab (p. 262)
Prominence of side-piece broad, with three or more rods and a leaf-like appendage..... 7
7. Leaf-like appendage arrow, spatulate.... *sphinx* Howard, Dyar & Knab (p. 302)
Leaf-like appendage broad..... 8
8. Lateral prominence of the side-piece with not over three rods, a leaf-like appendage and a seta..... 9
Lateral prominence with one or more additional setæ or appendages near the leaf-like appendage..... 13
9. Outer branch of the harpe long, conspicuous, arcuate..... 10
Outer branch of the harpe short, rudimentary.. *revocator* Dyar & Knab (p. 345)
10. Middle branch of harpagones conspicuously divided and dentate..... 11
Middle branch of harpagones not conspicuously divided and dentate
pinarocampa Dyar & Knab (p. 253)
11. Third branch of harpagones very large, tubular
stenolepis Dyar & Knab (p. 250)
Third branch of harpagones small, lanceolate..... 12
12. (These species can best be identified by comparison of our figures) *similis* Theobald, *tarsalis* Coquillett, *carmodyæ* Dyar & Knab, *janitor* Theobald, *lamentator* Dyar & Knab, *toweri* Dyar & Knab, *microsquamosus* Grabham, *eumimetes* Dyar & Knab, *corniger* Theobald, *equivocator* Dyar & Knab, *factor* Dyar & Knab, *proximus* Dyar & Knab.

Digitized by Google

13. Outer branch of harpe long, curved, long enough to reach to tip of harpes..... *stigmatosoma* Dyar, *mollis* Dyar & Knab, *vindicator* Dyar & Knab, *secutor* Theobald, *erythrothorax* Dyar, *elocutilis* Dyar & Knab, *revelator* Dyar & Knab, *salinarius* Coquillett, *comitatus* Dyar & Knab.
Outer branch of harpe short, not long enough to reach to tip of harpe..... 14
14. Outer branch of harpe distinct, curved..... 15
Outer branch of harpe rudimentary..... 18
15. Second branch of harpagone long, far exceeding tip of harpe *quinquefasciatus* Say (p. 354)
Second branch of harpagone not long..... 16
16. Middle branch of harpagone dentate..... 17
Middle branch of harpagone lanceolate..... *jubilator* Dyar & Knab (p. 273)
17. (These species can best be identified by comparison of our figures) *dictator* Dyar & Knab, *proclamator* Dyar & Knab, *interrogator* Dyar & Knab, *refector* Dyar & Knab.
18. (These species can best be identified by comparison of our figures) *pipiens* Linnaeus, *restuans* Theobald, *declarator* Dyar & Knab.
19. No basal lobe to side-pieces; plates of harpagones very large *coronator* Dyar & Knab (p. 288)
Side-piece with a setose basal lobe; plates of harpagones moderate *duplicator* Dyar & Knab (p. 236)
20. Lateral prominence of the side-piece irregular, divided or scattered or basally situated 21
Lateral prominence of the side-piece divided into two, usually subquadrate portions 27
Lateral prominence of the side-piece divided into two slender portions, the lower one again forked..... 34
21. Outer portion of lateral prominence reduced to a setose lobe, or absent leaving a basally situated part..... 22
Lateral prominence diffused along the lobe with an irregular series of projections and setæ..... 25
22. Outer portion of lateral prominence absent..... 23
Outer portion of lateral prominence present as setose lobe..... 24
23. Comb-process of harpes small..... *ocellatus* Theobald (p. 447)
Comb-process of harpes large..... *rejector* Dyar & Knab (p. 442)
24. Clasp-filament long, nearly as long as side-piece *daumastocampa* Dyar & Knab (p. 436)
Clasp-filament short, less than half the length of the side-piece *imitator* Theobald (p. 434)
25. Inner arm of harpe setose..... *inimitabilis* Dyar & Knab (p. 450)
Inner arm of harpe toothed..... 26
26. A low outer portion of side-piece bearing a leaf-like appendage *agitator* Dyar & Knab (p. 385)
A subquadrate outer portion bearing two truncate-capitate appendages *latisquama* Coquillett (p. 304)
A divided central portion bearing rods and setæ.. *bisulcatus* Coquillett (p. 307)
27. Side-piece with a large setose basal lobe.... *conservator* Dyar & Knab (p. 309)
Side-piece without this structure..... 28
28. Outer part of lobe of side-piece with a leaf-like appendage..... 29
Outer part of lobe of side-piece without a leaf-like appendage..... 32
29. Inner arm of harpe broad, crested with spines..... 30
Inner arm of harpe slender, bearing a comb..... 31
30. Harpe with a long basal curved outer limb... *extricator* Dyar & Knab (p. 326)
Harpe without this structure..... { *atratus* Theobald (p. 389) / *falsificator* Dyar & Knab (p. 426)
31. Outer part of lobe of side-piece beyond the middle *bastagarius* Dyar & Knab (p. 425)
Outer part of lobe of side-piece at middle.... *consolator* Dyar & Knab (p. 440)
32. Outer part of lobe of side-piece beyond middle..... 33
Outer part of lobe of side-piece at middle..... *pleuristriatus* Theobald (p. 438)
33. The divisions of the lobe of side-piece approximate short *restrictor* Dyar & Knab (p. 333)
Inner part of lobe of side-piece long, remote from the outer *jenningsi* Dyar & Knab (p. 445)
34. Side-piece swollen, subspherical..... 35
Side-piece normal 37

Digitized by Google

35. Comb-shaped limb of harpe small, short..... *abominator* Dyar & Knab (p. 379)
Comb-shaped limb of harpe long, exserted..... 36
36. Leaf-like appendage of lateral process of side-piece irregularly expanded
incriminator Dyar & Knab (p. 410)
Leaf-like appendage of lateral process of side-piece evenly rounded
peccator Dyar & Knab (p. 319)
37. Clasp-filament normal but with setæ or spines within..... 38
Clasp-filament subtriangular or foot-shaped setose or serrate without..... 40
Clasp-filament subdivided by a cleft, the outer part more or less swollen, setose without 44
38. Outer portion of process of side-piece short, with a leaf-like appendage sessile at base..... *carcinophilus* Dyar & Knab (p. 413)
Outer portion of process of side-piece long with a distorted leaf-like appendage near summit 39
39. Inner portion of process of side-piece with the two arms short, subequal
leprincei Dyar & Knab (p. 399)
Inner portion of process with the inner arm unequal, one long
invocator Dyar & Knab (p. 324)
40. Basal appendages very long..... *caudelli* Dyar & Knab (p. 396)
Basal appendages short, oblique..... 41
41. Middle division of harpagone slender, dentate at tip
{*inhibitator* Dyar & Knab (p. 292)
{*elevator* Dyar & Knab (p. 416)
Middle division of harpagone lamellate..... 42
42. Clasp-filament thick and swollen at tip..... *deceptor* Dyar & Knab (p. 409)
Clasp-filament slender at tip..... 43
43. Outer limb of lobe of side-piece with a leaf-like appendage
{*mutator* Dyar & Knab (p. 423)
{*conspirator* Dyar & Knab (p. 411)
{*trachycampa* Dyar & Knab (p. 330)
Without this structure..... *apateticus* Howard, Dyar & Knab (p. 321)
44. Projecting plate of harpagone broad with revolute margins
chrysonotum Dyar & Knab (p. 312)
Projecting plate of harpagone with slender stem and three sharp angles
{*hesitator* Dyar & Knab (p. 320)
{*mastigia* Howard, Dyar & Knab (p. 427)
Projecting plate of harpagone with a point and small inverted spines
reductor Dyar & Knab (p. 401)
Projecting plate of hargapone simple..... *pilosus* Dyar & Knab (p. 394)

The following species are not in our table:

tæniopus D. & K.
mortificator D. & K.
caraibeus How., D. & K.
annulipes Theob.
inquisitor D. & K.
bahamensis D. & K.
simulator D. & K.
spissipes Theob.
fur D. & K.
nigricorpus Theob.
barbarus D. & K.
palus Theob.
investigator D. & K.
erraticus D. & K.
corrigani D. & K.
ignobilis D. & K.
floridanus D. & K.
delys How., D. & K.
inflictus Theob.
scholasticus Theob.
egberti D. & K.
decorator D. & K.
nigripalpus Theob.
subfuscus Theob.
gravitator D. & K.
azymus D. & K.

LARVÆ (CULEX AND CARROLLIA).

1. Anal segment with hair-tufts along the ventral line preceding the posterior brush ..... *dyari* Coquillett (p. 460)
Anal segment with hair-tufts in the posterior brush only..... 2
2. Lateral comb of the eighth segment of many spines in a triangular patch.... 3
Lateral comb of the spines in a single row..... 54
3. Antennæ with the tuft at the middle of the uniformly shaped joint..... 4
Antennæ with the tuft at the outer third of the uniformly shaped joint
daumastocampa Dyar & Knab (p. 436)
Antennæ with the tuft outwardly placed, the part beyond slender..... 8
4. Air-tube very long (8 × 1), pecten teeth long spines; abdominal hairs in coarse stellate tufts..... *bisulcatus* Coquillett (p. 307)
Air-tube shorter, about four times as long as wide..... 5
Air-tube only about two and a half times as long as wide
corniger Theobald (p. 245)

Digitized by Google

5. Antennæ with a tuft; anal segment smooth 6
   Antennæ with a single hair; anal segment spined 7
6. Tufts of tube all beyond pecten ..... *restuans* Theobald (p. 335)
   Two basal tufts of tube within pecten ..... *janitor* Theobald (p. 260)
7. Pecten without detached teeth; tufts all beyond *pleuristriatus* Theobald (p. 439)
   Pecten with two detached teeth covering the two basal tufts *azymus* Dyar & Knab (p. 452)
8. Air-tube three times as long as wide or less 9
   Air-tube four times as long as wide or over 11
9. Pecten of the air-tube reaching to three-fourths of the tube 10
   Pecten of the air-tube small, reaching one-third only *barbarus* Dyar & Knab (p. 338)
10. Body glabrous ..... *reflector* Dyar & Knab (p. 420)
    Body pilose ..... *interrogator* Dyar & Knab (p. 418)
11. Anal appendages only two ..... *bahamensis* Dyar & Knab (p. 300)
    Anal appendages four, normal 12
12. Air-tube with three paired tufts posteriorly outwardly, the middle one moved laterad out of line, usually situated near the middle of the tube or not much beyond 13
    Air-tube with four paired tufts outwardly (sometimes increased by additional ones basally), the subapical one moved laterad out of line and usually situated at the outer third of the tube 22
    Air-tube with four to ten paired tufts, none displaced, or the hairs obsolete or absent 29
    Air-tube with five to six paired tufts, two much out of line toward dorsal aspect, situated near the middle of tube 63
13. Body glabrous; air-tube 7 × 1 14
    Body spicular or pilose at least on thorax 15
14. Pecten reaching to nearly one-half of tube ..... *dictator* Dyar & Knab (p. 267)
    Pecten reaching to one-fourth of tube ..... *mortificator* Dyar & Knab (p. 254)
15. Dislocated tuft of tube well beyond the middle 16
    Dislocated tuft of tube not, or scarcely beyond the middle 18
16. Basal tuft of tube 2-haired 17
    Basal tuft of tube 1-haired ..... *mollis* Dyar & Knab (p. 268)
17. Pecten teeth long (one-fourth) ..... *jubilator* Dyar & Knab (p. 274)
    Pecten teeth short (one-fifth) ..... *carmodyæ* Dyar & Knab (p. 256)
18. Pecten of the air-tube short; first tuft well beyond pecten 19
    Pecten of the air-tube long; first tuft close to or within pecten 20
19. Anal processes broad and bluntly rounded ... *extricator* Dyar & Knab (p. 326)
    Anal processes long and tapered, rather sharply pointed *equivocator* Dyar & Knab (p. 329)
20. Basal tuft of the tube close to the pecten 21
    Basal tuft of the tube well within the pecten. { *revelator* Dyar & Knab (p. 275) / *vindicator* Dyar & Knab (p. 265) }
21. Air-tube very slightly flared at tip; pecten very long, as long as the diameter of the tube at middle ..... *proclamator* Dyar & Knab (p. 280)
    Air-tube regularly tapered on the outer two-thirds; pecten long but not equalling over half the diameter of the tube { *declarator* Dyar & Knab (p. 270) / *inquisitor* Dyar & Knab (p. 271) }
22. Air-tube long, over 5 × 1, the sides nearly straight without marked tapering. 23
    Air-tube less than five times as long as wide, the sides curved, tapering rather rapidly after the middle, subfusiform 28
23. Body glabrous 24
    Body spicular-pilose 27
24. Third tuft of tube well out of line 25
    Third tuft of tube moved slightly out of line; head-hairs 5 and 4 *erythrothorax* Dyar (p. 316)
25. Two basal tufts of air-tube short, multiple ..... *salinarius* Coquillett (p. 375)
    Two basal tufts of air-tube long, single *proximus* Howard, Dyar & Knab (p. 378)
    Two basal tufts of air-tube double, long 26

Digitized by Google

26. Head-hairs in threes..... *microsquamosus* Grabham (p. 405)
Head-hairs in fours and sixes..... *pinarocampa* Dyar & Knab (p. 253)

27. Air-tube 8 × 1, the tufts 3-haired and short; antennæ dark
{*habilitator* Dyar & Knab (p. 263)
{*eremita* Howard, Dyar & Knab (p. 262)
Air-tube 6 × 1, the tufts 2-haired and long; antennæ pale at base
factor Dyar & Knab (p. 372)
Air-tube 7 × 1, the tufts 2-haired and short
caribeus Howard, Dyar & Knab (p. 257)
Air-tube 7 × 1, the tufts single and very long; antennæ pale
similis Theobald (p. 341)

28. Air-tube 5 × 1, pecten teeth about 15; subdorsal hairs of abdominal segments 3 and 4 double..... *pipiens* Linnaeus (p. 366)
Air-tube 5 × 1, pecten teeth about 11; subdorsal hairs of abdominal segments 3 and 4 double..... *revocator* Dyar & Knab (p. 345)
Air-tube 4 × 1, pecten teeth about 10; subdorsal hairs of abdominal segments 3 and 4 double..... *comitatus* Dyar & Knab (p. 370)
Air-tube 4 × 1, pecten teeth about 9; subdorsal hairs of abdominal segments 3 and 4 single..... *quinquefasciatus* Say (p. 354)
Air-tube 5 × 1, pecten teeth about 11; subdorsal hairs of abdominal segments 3 and 4 in threes..... *stigmatosoma* Dyar (p. 237)

29. Air-tube with a subapical crown of spikes; body pilose
coronator Dyar & Knab (p. 288)
Air-tube without a crown of spikes, smooth throughout..... 30

30. Air-tube with long well-defined tufts..... 31
Air-tube with small double or single hairs, or bare..... 46

31. Body spicular-pilose 32
Body glabrous or lightly granular..... 40

32. Five tufts on posterior margin of the tube subequal in length, short..... 33
Five tufts on tube with basal one long, the rest progressively shorter; abdominal hairs in threes on segments 3 to 5..... 36

33. Lateral abdominal hairs in twos on segments 3 to 5..... 34
Lateral abdominal hairs in fours or threes on segments 3 to 5..... 35

34. Air-tube 11 × 1; upper head-hair double; pecten of the air-tube moderate
derivator Dyar & Knab (p. 292)
Air-tube 6 × 1; upper head-hair single; pecten long
investigator Dyar & Knab (p. 381)
Air-tube 6 × 1; upper head-hair multiple; pecten rather long
inhibitator Dyar & Knab (p. 393)

35. Air-tube 9 × 1 ..... *atratus* Theobald (p. 390)
Air-tube 5 × 1..... {*trachycampa* Dyar & Knab (p. 331)
{*abominator* Dyar & Knab (p. 380)

36. Comb only two rows deep, large scales; body long-pilose
chrysonotum Dyar & Knab (p. 312)
Comb three rows deep..... 37

37. Upper head-hair triple; tufts of tube long, the basal one over half the length of the tube..... 38
Upper head-hair single or double; tufts of tube all shorter than half its length 39

38. Body hairy; upper head-tuft of three long hairs. *mutator* Dyar & Knab (p. 423)
Thorax only hairy, abdomen glabrous; upper head-tuft of four short hairs
bastagarius Dyar & Knab (p. 425)

39. Pecten of tube dense and fine, not as long as diameter of tube
conspirator Dyar & Knab (p. 411)
Pecten sparse and open, equalling the diameter of tube at middle; air-tube often blackish banded mesially..... *elevator* Dyar & Knab (p. 416)

40. Air-tube concave, the tip expanded..... 41
Air-tube regularly tapered, the tip not widened..... 42

41. Pecten of air-tube short; antennæ pale at base; lateral comb of the eighth segment a large patch of spines..... *territans* Walker (p. 296)
Pecten of the air-tube of long spines; antennæ dark; lateral comb of the eighth segment scarcely over two rows deep
simulator Dyar & Knab (p. 302)

Digitized by Google

42. Both head-hairs single..... *gravitator* Dyar & Knab (p. 448)
Upper head-hair triple, lower single..... *decorator* Dyar & Knab (p. 427)
Both head-hairs triple or multiple..... 43
43. Lateral abdominal hairs in threes after the second segment; body glabrous; air-tube not over five times as long as wide.. *tarsalis* Coquillett (p. 233)
Lateral abdominal hairs in twos after the second segment; body spicular-granular; air-tube six times as long as wide..... 44
44. Air-tube with ten close tufts; antennæ pale at base; dorsal tufts of anal segment 1 + 3 on each side..... 45
Air-tube with 6 to 7 sparse tufts; antennæ dark; dorsal tufts of anal segment 1 long + 1 long and 1 short..... *lamentator* Dyar & Knab (p. 278)
45. Antennæ pale on basal portion..... *secutor* Theobald (p. 285)
Antennæ dark throughout..... *towері* Dyar & Knab (p. 282)
46. Air-tube with slight tufts..... 47
Air-tube with single hairs or bare..... 49
47. Pecten dense and fine; lateral hairs in threes after the second segment *carcinophilus* Dyar & Knab (p. 414)
Pecten sparse and long..... 48
48. Lateral abdominal hairs in twos after the second segment; comb of eighth segment of very long spines..... { *rejector* Dyar & Knab (p. 442) / *jenningsi* Dyar & Knab (p. 445) }
Lateral abdominal hairs in fours after the second segment; comb of shorter spines and more rows deep..... { *imitator* Theobald (p. 434) / *ocellatus* Theobald (p. 448) }
49. Pecten of the air-tube sparse and long..... 50
Pecten of numerous teeth densely and regularly spaced..... 51
50. Pecten of the air-tube of five teeth on basal seventh of tube *inimitabilis* Dyar & Knab (p. 450)
Pecten of the air-tube of eight teeth on basal fifth of tube *consolator* Dyar & Knab (p. 440)
51. Lateral abdominal hairs single on segments 3 to 5 *corrigani* Dyar & Knab (p. 387)
Lateral abdominal hairs double or in threes on segments 3 to 5..... 52
52. Air-tube with four rather long single hairs on posterior margin *restrictor* Dyar & Knab (p. 333)
Air-tube with a single small hair or none..... 53
53. Pecten of the air-tube reaching one-fourth... *conservator* Dyar & Knab (p. 309)
Pecten of the air-tube reaching to one-third..... *latisquama* Coquillett (p. 305)
54. Antennæ with the tuft at the middle, slight..... 55
Antennæ with the tuft from a notch beyond the middle..... 56
55. Air-tube with 15 tufts along the posterior line *Carrollia urichii* Coquillett (p. 466)
Air-tube with not over 10 tufts along the posterior line *Carrollia iridescens* Lutz (p. 464)
56. Air-tube over 4 × 1, slender, scarcely tapered, with slight terminal setæ.... 57
Air-tube not over 4 × 1, stout at base, tapering, slightly curved forward with two stout hooks at tip..... 59
57. Bars of comb in a perfectly regular row; body glabrous *melanurus* Coquillett (p. 454)
Bars of comb in an irregular row; body pilose..... 58
58. Scales of comb moderate..... *erraticus* Dyar & Knab (p. 383)
Scales of comb elongate, spinose..... *leprincei* Dyar & Knab (p. 399)
59. Bars of comb in a curved row..... 60
Bars of comb in a straight row; body glabrous..... 62
60. Body pilose ..... *pilosus* Dyar & Knab (p. 394)
Body glabrous 61
61. Lateral abdominal hair in threes; basal tuft of tube below middle of pecten *reductor* Dyar & Knab (p. 402)
Lateral abdominal hair in twos; basal tuft of tube beyond middle of pecten *floridanus* Dyar & Knab (p. 403)
62. Comb of 16 bars..... *caudelli* Dyar & Knab (p. 397)
Comb of 8 bars only..... *agitator* Dyar & Knab (p. 385)
63. Tufts of tube along posterior line, 2-haired.... *stenolepis* Dyar & Knab (p. 251)
Tufts of tube along posterior line many-haired. *eumimetes* Dyar & Knab (p. 240)

Digitized by Google

The following species are omitted, as the larvæ are unknown:

duplicator D. & K.
elocutilis D. & K.
tæniopus D. & K.
annulipes Theob.
sphinx How., D. & K.
spissipes Theob.
fur D. & K.
delys How., D. & K.
peccator D. & K.
hesitator D. & K.
apateticus How., D. & K.
invocator Pazos.
palus Theob.
ignobilis D. & K.
scholasticus Theob.
deceptor D. & K.
incriminator D. & K.
egberti D. & K.
falsificator D. & K.
nigripalpus Theob.
inflictus Theob.
subfuscus Theob.
nigricorpus Theob.
mastigia How., D. & K.

CULEX TARSALIS Coquillett.

Culex n. sp., Williston, No. Am. Fauna No. 7, Div. Orn. & Mam., U. S. Dept. Agr., 253, 1893.
Culex tarsalis Coquillett, Can. Ent., xxviii, 43, 1896.
Culex willistoni Giles, Handb. Gnats or Mosq., 281, 1900.
Culex tarsalis Coquillett, U. S. Dept. Agr., Div. Ent., Circular 40, 2d ser., 5, 6, 1900.
Culex tarsalis Howard, U. S. Dept. Agr., Div. Ent., n. s., Bull. 25, 19, 20, 1900.
Culex tarsalis Howard, Mosquitoes, 237, 238, 1901.
Culex tarsalis Theobald, Mon. Culic., ii, 23, 1901.
Stegomyia (?) *tarsalis* Giles, Gnats or Mosq., 2 ed., 379, 1902.
Culex affinis Adams (not Stephens), Kans. Univ. Bull., ii, 25, 1903.
Culex kelloggii Theobald, Can. Ent., xxxv, 211, 1903.
Culex tarsalis Coquillett, Can. Ent., xxxv, 261, 1903.
Culex peus Speiser, Insecktenbörse, xxi, 148, 1904.
Culex tarsalis Dyar, Proc. Ent. Soc. Wash., vi, 40, 1904.
Stegomyia (?) *tarsalis* Blanchard, Les Moustiques, 265, 1905.
Culex tarsalis Felt, Bull. 97, N. Y. State Mus., 484, 1905.
Culex tarsalis Dyar, Journ. N. Y. Ent. Soc., xiii, 26, 55, 1905.
Culex tarsalis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 219, 1906.
Culex tarsalis Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 23, 1906.
Culex tarsalis Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Culex tarsalis Quayle (in part), Univ. Cal. Agr. Exp. Sta., Bull. 178, 48, 1906.
Culex kelloggii Theobald, Mon. Culic., iv, 391, 1907.
Culex tarsalis Theobald, Mon. Culic., iv, 394, 1907.
Culex tarsalis Dyar, Proc. U. S. Nat. Mus., xxxii, 123, 1907.
Culex tarsalis Thibault, Proc. Ent. Soc. Wash., xii, 20, 1910.
Culex tarsalis Theobald, Mon. Culic., v, 341, 1910.
Culex kelloggii Theobald (in part), Mon. Culic., v, 342, 1910.

ORIGINAL DESCRIPTION OF CULEX N. SP.:

Female.—Dark brown or black, the occiput covered with white and brown tomentum. Palpi black, at the tip silvery. Proboscis black, with a white ring beyond the middle. Antennæ black. Dorsum of thorax covered with brown and white tomentum, the white toward either side posteriorly, and forming two slender lines, abbreviated anteriorly. Pleuræ with white tomentum. Abdomen deep brown, with six conspicuous rings of white tomentum on the anterior part of the segments, the ground-color under them yellow; on the second segment a white tomentose spot in front. Legs nearly black, the base of all the femora yellowish. On the outer side of the femora, in large part, and along the whole inner side of the legs, as also moderately broad rings at the articulations of all the tarsal joints, white. Wings nearly hyaline; tomentum blackish, distributed nearly evenly on the veins. Length, 6 mm.

One specimen, Argus Mountains, Calif., April. This species is closely allied to *C. annulatus* Meigen, which occurs in the western regions and in Mexico, but seems to differ in the uniformly distributed tomentum of the wings.

ORIGINAL DESCRIPTION OF CULEX TARSALIS:

♂. Head black, its pile and tomentum mixed brown and white; antennæ brown, apices of joints one to eleven broadly white, the hairs gray; proboscis nearly twice as long as the head and thorax united, naked, black, marked near the middle with a broad white ring; palpi slender, tapering to the tip, brown, the base of each joint white, sides of last two joints and outer side of the preceding one rather long gray pilose. Thorax black, marked with a dorsal gray vitta, tomentum of thorax yellowish, except a white subdorsal undulating line each side, a spot in front of the scutellum, above the root of each wing, and on the pleura. Abdomen black, a fascia

Digitized by Google

of white tomentum at base of each segment and at apices of the last three. Legs brown, in front and behind covered with white tomentum, bases of femora yellow, both ends of tarsal joints broadly white; front and middle tarsal claws each bearing a tooth on the under side, hind tarsal claws simple. Wings hyaline; scales of veins brown, with a few white ones intermixed.

♀ same as the ♂, with these exceptions: Palpi black, the apex broadly and inner side of apex of the penultimate joint covered with white tomentum; antennæ wholly brown; tarsal claws destitute of teeth. Thorax sometimes yellowish-brown. Length, 4.5 mm.

Argus Mts. and Folsom, Calif. One male and four females in the National Museum, collected by Mr. A. Koebele.

Closely related to *tæniorhynchus*, Wied., but in that species the male has a tooth on under side of one tarsal claw and two beneath the other claw, and the female has each front tarsal claw toothed.

ORIGINAL DESCRIPTION OF CULEX AFFINIS:

Female: Head and members dark brown, proboscis lighter in the middle; scales of head light brown; thorax brown, mesonotum uniformly covered with brownish yellow scales, pile black, scales of pleuræ mostly white, abdomen brownish scaled, a narrow band at bases of segments white, pile pale yellow, venter white-scaled; coxæ and base of femora pale yellow, distal end of latter dark brown, tibia dark brown with extreme apex and base white; tarsi concolorous with both ends of joints white, which on the front tarsi is indistinct, and the last joint of hind tarsi wholly white; claws small, simple; veins of wings thinly clothed with light brown scales, petiole of first submarginal cell one-third length of that cell, cross-veins at ends of first and second basal cells the length of the cross-vein at end of second basal cell distant from each other. Length, 3.5 mm.

One specimen; Arizona. Prof. F. H. Snow.

ORIGINAL DESCRIPTION OF CULEX KELLOGGII:

Thorax brown, with reddish-brown scales showing linear arrangement, two small pale spots, some rows of gray scales behind and on the scutellum. Proboscis black, with a white band. Abdomen black, with basal white bands and lateral spots. Legs black; femora pale at base, with a white line or row of spots, also the tibiæ, with a line of white spots. Metatarsi and tarsi showing apical and basal white banding; last hind tarsus with a black median band or all white. Wings unspotted.

♀.—Head brown, clothed with narrow-curved gray scales in the middle and behind, white ones forming a border around the eyes, brown ones between; at the sides small flat white scales, in the middle are numerous ochraceous upright forked scales, laterally the upright forked scales are black, two long brown bristles project forward between the eyes. Palpi black-scaled, with some large white scales at the apex, and some forming a ring near base; apex, etc., with a few dark bristles; proboscis black, with a prominent white band; antennæ black, basal and second joints dark, testaceous, the basal joint with white scales internally; clypeus brown. Thorax brownish-black, with rich reddish-brown narrow-curved scales, and a few broader gray ones at the sides in front, and some arranged in lines behind the mesonotum, on its surface are two small pale spots, two of the posterior white lines being continued back from them, two short, broader ones are situated in front of the bare space before the scutellum; the reddish-brown scales have a linear arrangement, due to two prominent median bare lines; bristles black; scutellum brown, with narrow-curved pale scales and brown border-bristles; metanotum deep brown; pleura brown, with some gray scales. Abdomen black, with basal white bands and white lateral spots and brown border-bristles; apex bristly; venter yellowish-brown, with scattered gray scales. Legs black, banded, striped and spotted in lines with white; base of femora gray to dull ochraceous, pale ventrally, with a row of white spots above, almost forming a white line; apex with a white spot; tibiæ also with a row of white spots, forming almost a line, apex white; fore and mid metatarsi and tarsi with narrow apical and basal yellowish bands, except the last tarsal segment; in the hind legs the metatarsi and tarsi have broad, almost white bands, the last tarsal in some specimens being almost all white; ungues equal and simple. Wings with the veins very densely scaled with typical brown Culex scales; those at the base of the third long vein thicker, forming a small, rather obscure, dark spot; first submarginal cell longer and considerably narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem about one-third of the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein not quite its own length distant from the mid cross-vein; fringe dark brown; halteres testaceous, knob darkened.

Length.—5 to 5.5 mm.

Digitized by Google

♂.—Palpi brown, the last two joints nearly as long as the ante-penultimate, the penultimate slightly shorter than the apical; the last two joints with long brown hairs on each side, also on one side of the apex of ante-penultimate joint; there is a narrow pale band at the base of the last two joints and also near the base of the long ante-penultimate joint; proboscis black, with a narrow white band on the base of the apical half; antennæ banded black and white, with flaxen plume-hairs. The head with more gray scales than in the ♀. Thorax and abdomen as in the ♀. Legs as in the ♀; ungues of the fore and mid legs unequal, both uniserrated, on the hind legs equal and simple. Wings narrow; the fork-cells short; the first submarginal longer and narrower than the second posterior, its stem more than half the length of the cell; stem of the second posterior as long as the cell; posterior cross-vein about its own length distant from the mid cross-vein.

Length.—5 to 5.5 mm.

Habitat.—Stanford University, California.

Time of Capture.—September and October.

Observations.—Described from a series of 5 ♀s and 4 ♂s sent me by Professor Kellogg. It is a very marked species, but presents at first sight a resemblance to *Culex tæniorhynchus*, Wiedemann. It differs however, in (1) having the legs apically and basally pale banded, (2) in their being marked with lines or lines of spots, and (3) in the simple, not uniserrated, ungues in the ♀ (4), in the structure of the ♂ palpi, etc. Moreover, a hasty examination will show that this species is not nearly so compactly built as in *tæniorhynchus*. The specimens show some variation, both in regard to the thoracic adornment and in the leg ornamentation. One ♀ has no signs of the two small pale thoracic spots, and the last hind tarsal in one appears almost white, and in others the median dark band is very broad, making the tarsal segment almost all dark coloured.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX TARSALIS:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture black, a sharply limited white band before the middle; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, one-fifth the length of proboscis, black, with small white tips. Antennæ with the joints subequal, rugose, pilose, black, the second joint slightly enlarged, with a patch of white scales on inner side; tori subspherical, with a cup-shaped apical excavation, yellowish, shading to black within, with a patch of white scales on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, with a slight median groove, dull black, nude. Eyes black. Occiput black, clothed with narrow curved scales which are mostly white, distinctly so along margins of eyes, but brownish in a large patch each side of the middle, many erect serrate-tipped scales, black on the sides, brown in the middle.

Prothoracic lobes elliptical, remote dorsally, blackish, clothed with narrow, curved, white and pale-brown scales in the middle and many dark bristles. Mesonotum blackish clothed with narrow, curved bronzy-brown scales, the anterior edge margined with white running to the middle of the sides, a white stripe starting behind the lateral depression and running to the posterior margin, antescutellar space edged with white; bristles rather numerous, long, black. Scutellum trilobate, brown, clothed with narrow, curved white scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ pale brown, with small patches of elliptical, flat white scales and rows of small brown bristles.

Abdomen subcylindrical, flattened, truncated posteriorly; dorsal vestiture black, a yellowish-white band at base of each segment, widening at the side into a row of white lateral patches; first segment with small median and lateral patches of white scales and with many pale hairs; venter yellowish white, each segment with a black V-shaped mark with the apex on the posterior border of the segment.

Wings ample, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant its own length from anterior cross-vein; scales brown, black costally, intermixed with some white ones on costa and subcosta, outstanding ones dense, long, linear, base of third vein with a slight tuft. Halteres whitish.

Digitized by Google

Legs slender, moderate; femora black, tips white and a fine white line on either side; tibiæ black, narrowly lined with white on each side and extreme base and tip narrowly white; tarsi black, each joint with a white band at base and tip, first tarsal joint very narrowly white-lined within; the front tarsi with the first to third joints only narrowly ringed; mid tarsi with first to fourth narrowly ringed, last joint black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4.5 mm.

Male.—Proboscis longer and slenderer than in female. Palpi exceeding proboscis by more than length of last joint, last joint pointed, penultimate one slightly enlarged, vestiture black, long joint pale ringed before the middle, the others white at base, outer half of long joint and the last two joints with long dense hairs. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, each with a narrow black ring at insertion of hair-whorl; hairs long, fine, black. Coloration similar to the female. Wings narrower than in the female, vestiture sparse. Abdomen elongate, narrow basally, depressed and broadened on apical half; basal pale bands broader; lateral ciliation long, fine and abundant, pale brown. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wing 4 mm.

Genitalia (plate 17, fig. 125): Side-pieces two and one-half times as long as wide, tip conically tapered; marginal filaments subapical at end of a narrow ridge consisting of three rods with bent tips, a leaf-like appendage, and a seta. Clasp-filament moderate, curved, slightly enlarged at base, with an articulated terminal spine. Harpes furcate, inner branch long, curved, outer conical, bearing a dense tuft of spines. Harpagones furcate, one branch simple, with rounded tips, the other divided into four blunt coarse teeth. Basal appendages represented by a row of small sharp spines.

Larva, Stage IV (plate 104, fig. 347).—Head subquadrate, rounded, wider than long, front margin arcuate; eyes slightly bulging, blunt pointed. Antennæ elevated on a triangular insertion, long, curved, terminal third narrow, a notch bearing a very large tuft of feathered hairs, below which the thick basal part is densely spined and pale colored; three long spines and a short one at tip. Both pairs of dorsal and ante-antennal tufts multiple. Mental plate elongate triangular, with a prominent central tooth and seven on each side, the fifth large and prominent, the last small. Mandible quadrangular, with slight spines near base; two long filaments, two slender ones, and a tuft of hairs from a notch before tip; an outer row of cilia from a collar; a row of hair-tufts arising from rounded prominences just within outer margin; dentition of four teeth on a process, the first longest; a long, curved tooth and two short ones at base, a very long serrate filament and row of feathered hairs within; process below long, oblique, furcate, with hair-tufts at tip of each limb and in two rows on the process; basal angle small, with a row of stout hairs within; basal hairs divided into two groups. Maxilla elongate, conical, divided by a suture; inner half with a patch of stout hairs on margin; a row of long hairs at tip running along the suture, mixed with some shorter feathered ones; outer half with two filaments at the suture below the middle and a patch of hairs near them; a spine on other side. Palpus very small, slender, with small terminal digits, one of which is longer than the others. Thorax rounded, somewhat square, wider than long; hairs abundant, very long. Abdomen moderate, anterior segments shorter; hairs moderate, the lateral tufts triple beyond second segment. Tracheal tubes narrow, linear, flexuous. Air-tube slender, long, a little over four times as long as wide, uniformly and very slightly tapered, without any apical expansion; pecten small, reaching about one-third of length of tube, followed by five tufts along the posterior line, the last smallest; pecten tooth a moderate spine with wide base, from which arise

Digitized by Google

three long branches. Lateral comb of eighth segment of numerous scales in a triangular patch; single scale angularly elliptical, produced into a long, broad shaft, which is fringed with long spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft of long and short hairs; a small lateral tuft; ventral brush well developed, limited by the plate. Anal gills small, tapered, not as long as the segment.

The larvæ inhabit the edges of ponds and lakes where protected by vegetation. The species is dominant throughout the arid portion of North America, where the standing water becomes more or less stagnant. Dr. Dyar found it throughout the Pacific coast from southern California to British Columbia. All kinds of semistagnant pools are frequented by these larvæ, but they seldom take kindly to artificial receptacles, being found only in the open. The adults doubtless hibernate, and bite by night. They may be troublesome in houses; Messrs. Dyar and Caudell obtained specimens in the act of biting out of doors at night.

Western United States and Canada, extending from the Pacific coast southward into Mexico and eastward across the Mississippi River.

Argus Mountains, California, April, 1891 (A. Koebele); San Diego, California, April 14–27, 1906 (J. M. French); San Rafael, California, July 16, 1904 (E. H. Ashman); Santa Monica, Los Angeles, and Pasadena, California, May, 1906 (H. G. Dyar); Tia Juana, Baja California, Mexico (Dyar & Caudell); San Diego, Guadeloupe, Dunsmuir, Sisson, San Luis Obispo, and Thrall, California (Dyar & Caudell); Stanford University, California (I. McCracken); Folsom, California, July 3, 1885 (———); Carr Canyon, Huachuca Mountains, Cochise County, Arizona, August, 1905 (H. Skinner); Klamath Lake, Oregon, July, 1906 (Dyar & Caudell); Portland, Oregon (R. P. Currie); Victoria, British Columbia, July, 1906 (Dyar & Caudell); Kaslo, British Columbia, June 23, 1903 (H. G. Dyar); Ormsby County, Nevada, July 6 (C. F. Baker); Boise, Idaho, August 14, 1901 (C. B. Simpson); Colorado Springs, Colorado, April (T. D. A. Cockerell); Boulder, Colorado, October 15, 22, November (T. D. A. Cockerell); Grand Junction, Colorado, July 23, August 28, 1906 (E. P. Taylor); Denver, Colorado, August (E. S. Tucker); Fort Sill, Oklahoma (through C. S. Ludlow); Lawrence, Kansas, June (E. S. Tucker); Lawrence, Kansas (J. M. Aldrich); Dallas, Texas, November 10, 1905 (F. C. Pratt); Dallas, Texas, May 11, 1905 (W. D. Pierce); Victoria, Texas (E. G. Hinds); St. Louis, Missouri, September, 1904 (A. Busck); Scott, Arkansas, October 1, 1909 (J. K. Thibault, Jr.); Urbana, Illinois, September 2, 7, 8, 10, 1904 (F. Knab); Ames, Iowa, October 18, 1905 (H. J. Quayle); Enseñada, Mexico (A. Dugès).

This species was first described by Professor Williston, but without a name. Giles and Speiser independently proposed names, that of Speiser intended to replace the preoccupied name *affinis* Adams, but the species had been previously named by Coquillett. The species is common in the arid West, becoming less abundant in its eastward range. The larvæ from the easternmost localities have longer air-tubes than those from the westernmost, but we think that the various local forms are not specifically distinct.

The coloration of the adult, as in other species of *Culex*, is subject to considerable variation. This is particularly true of the thoracic markings, which are often more or less evanescent; frequently the subdorsal stripes are broken into spots. On the abdomen the dorsal band of the second segment is triangularly produced beyond the middle, and on the three or four succeeding segments the bands are broadened towards the middle; frequently the first three or four bands are interrupted at the sides and do not join the lateral spots. The mental plate of the larva is figured on plate 139, fig. 562. The larva figured by Quayle (*l. c.*, p. 49, fig. 33) as this species belongs to *Culex stigmatosoma*.

Digitized by Google

CULEX DUPLICATOR Dyar & Knab.

Culex duplicator Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 258, 1909.

ORIGINAL DESCRIPTION OF CULEX DUPLICATOR:

Proboscis uniform, black-scaled with a broad white ring at the middle. Abdomen black above, with rather narrow white basal segmental bands, some of them slightly produced in the middle. Legs black, femora and tibiæ white-lined on the outer side, the tarsal joints broadly white-ringed at base and apex. Wing-scales narrow, those on the forks of the second vein moderately long, narrowly lanceolate.

Five specimens, San Francisco Mountains, Santo Domingo (A. Busck).

Type no. 12111, U. S. N. M.

DESCRIPTION OF FEMALE AND MALE OF CULEX DUPLICATOR (LARVA UNKNOWN):

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture black, a sharply limited white band near the middle; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, one-sixth the length of proboscis, black, with small white tips. Antennæ with the joints subequal, rugose, pilose, black, the second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, yellowish, shading to black within; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, brown, nude. Eyes black. Occiput black, clothed with narrow curved scales, pale shining brown, margin of eyes white; many erect forked black ones forming a patch on each side, the cheeks with broad white scales; a row of bristles along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, pale brown, clothed with narrow, curved white scales and pale bristles. Mesonotum brown, clothed with narrow, curved golden-brown scales, paler along margins of disk and about the antescutellar space; bristles rather numerous, pale brown. Scutellum trilobate, clothed with narrow, curved pale scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, pale brown, nude. Pleuræ and coxæ pale brown, with small patches of elliptical, flat white scales and rows of small pale bristles.

Abdomen subcylindrical, depressed, truncated posteriorly; dorsal vestiture black, a yellowish-white band at base of each segment except the first, widening at side into a row of white lateral patches; venter yellowish white, each segment with a black mark on the posterior border.

Wings ample, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales brown, black on the costa, the outstanding ones linear, those on second to fourth veins apically dense and narrowly lanceolate. Halteres whitish with dark knobs.

Legs moderate; femora black, the tips white, white beneath; tibiæ black, with a narrow pale line on each side reaching nearly to apex, tips white; tarsi black, each joint with a white band at base and tip, first tarsal joint very narrowly white-lined within; front tarsi with the first to third joints only narrowly ringed; mid tarsi like the front ones. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 3 mm.

Male.—Proboscis longer and slenderer than in the female, straight, gradually enlarged towards apex, the white ring at the middle narrow. Palpi exceeding the proboscis by about the length of the last joint, the penultimate one slightly enlarged; vestiture black, the long joint with a pale ring at basal third and one at apical third; last two joints white-marked at base; outer half of the long joint and the last two joints with long, dense black hairs. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, each with a narrow black ring at insertion of the hair-whorl; hairs long, fine, black. Coloration similar to the female. Wings narrower than in the female, the stems of

Digitized by Google

the fork-cells longer, vestiture sparser. Abdomen elongate, depressed; lateral ciliation of long, fine, pale brown hairs. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 9, fig. 60): Side-pieces over twice as long as wide, tips conically tapered, a double, quadrate lobe beyond the middle, the outer portion bearing three stout rods with hooked tips and two small setæ, the inner portion bearing five coarse setæ. Clasp-filament moderate, tapering beyond the middle, with a small inserted terminal claw. Harpes rather small, double, inner lobe a broad plate with angular corners, outer lobe blade-like and curved. Harpagones divided into numerous lamellæ, the innermost ones somewhat separated.

The larvæ live in ground-pools containing foul water. Mr. Busck obtained them in a pond in woods frequented by swine, in which were also larvæ of *Anopheles albimanus* and *Psorophora infine*.

Island of Santo Domingo, West Indies.

San Francisco Mountains, September, 1905, bred from larvæ (A. Busck).

Culex duplicator closely resembles *Culex tarsalis*, and was at first confounded with that species. It does not obviously differ therefrom, yet is separated by a considerable geographical interval. *Culex tarsalis* inhabits the western part of the North American mainland and nowhere reaches the Atlantic coast, while *Culex duplicator* has been received only from one of the West Indian Islands.

CULEX STIGMATOSOMA Dyar.

Culex tarsalis Quayle (in part), Univ. Cal. Agr. Exp. Sta., Bull. 178, 48, 1906.
Culex stigmatosoma Dyar, Proc. U. S. Nat. Mus., xxxii, 123, 1907.
Culex stigmatosa Theobald, Mon. Culic., v, 615, 1910.

ORIGINAL DESCRIPTION OF CULEX STIGMATOSOMA:

Head with black and golden scales behind, side of occiput pale gray; eyes narrowly white behind; proboscis black with a white band a little beyond the middle; palpi and antennæ black. Thorax bronzy brown with longitudinal striation, a round whitish spot on each side at the middle, from which an obsolete pale stripe runs backward; sides sparsely pale yellowish scaled, the integument greenish at the bases of the legs. Legs black, the femora whitish below, no white lines above; tibiæ black, with a small white apex and a long whitish line within; tarsi black, a white ring at base and apex of each joint, including the terminal joint. Abdomen black, with broad white bands on the bases of the segments above, whitish scaled below with a row of median segmentary round diffuse black spots. Wing scales narrow, entirely black, not forming spots.

Three hundred and twenty-two specimens, Pasadena, California, larvæ in a pond in a lawn; Laguna, larvæ in a well hole by the edge of a lake; San Diego, in an old water vat on a wharf; Sweetwater Junction, in pools in a stream bed; San Luis Obispo, in a pool in a rocky canyon (A. N. Caudell); Avalon, Santa Catalina Island, in a rain-water barrel; Chico, in a horse trough (A. N. Caudell); Plant Introduction Garden, near Chico, in a barrel in a small stream; Klamath Falls, Oregon, a captured specimen.

Type.—Cat. No. 10008, U. S. N. M.

The larva falls in the table * with *pipiens* and *cubensis;* it has the tube five times as long as wide, somewhat fusiform in shape, the pecten with about 11 teeth; lateral hairs of the third and fourth abdominal segments in threes.

This species has, no doubt, been confounded with *tarsalis* Coquillett, but it differs conspicuously in the coloration of the underside of the abdomen, which has only a row of round black spots, while in *tarsalis* there is a series of doubly bent transverse bars.

* Journ. N. Y. Ent. Soc., XIV, 1906, p. 206.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX STIGMATOSOMA:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture black, a rather broad, sharply limited white band at middle; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, one-fifth the length of the proboscis, black, with small white tips. Antennæ with the joints subequal, rugose, pilose, black, the second joint slightly enlarged, with a patch of white scales on inner side; tori subspherical, with a

Digitized by Google

cup-shaped apical excavation, yellowish, shading to black within, with a patch of white scales on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, with a slight median groove, dull black, nude. Eyes black. Occiput black, clothed with narrow curved scales which are pale brownish, ocular margin and sides white; many erect, serrate-tipped pale-brownish scales on the nape.

Prothoracic lobes elliptical, remote dorsally, blackish, clothed with narrow, curved white and pale brown scales in the middle and many dark bristles. Mesonotum blackish, clothed with narrow, curved bronzy-brown scales, some paler scales along anterior margin; an obscure pale stripe starting behind the lateral depression and running to posterior margin; ante-scutellar space edged with white; bristles rather numerous, long, black. Scutellum trilobate, brown, clothed with narrow, curved white scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ pale luteous, the pleuræ with dark spots; small patches of elliptical, flat white scales and rows of small brown bristles.

Abdomen subcylindrical, flattened, truncated posteriorly; dorsal vestiture black, a yellowish-white band at base of each segment except the first, narrowing at the side, joining a row of diffused white lateral patches; venter white-scaled with black scales intermixed, which form large, diffused, rounded, median subapical patches.

Wings ample, hyaline; petiole of second marginal cell nearly half as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant its own length from anterior cross-vein; scales brown, black on costa, the outstanding ones dense, long, linear. Halteres whitish.

Legs slender, long; femora black, white below nearly to tips; knees white; tibiæ black, with a few white scales on inner side and extreme base and tip narrowly white; tarsi black, each joint with a white band at base and tip; front and mid tarsi with the rings very narrow and present only on first and second joints and base of third. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4.5 mm.

Male.—Proboscis straight, slightly longer than in the female. Palpi long and slender, exceeding the proboscis by nearly the length of the last two joints, last joint pointed, penultimate one slightly enlarged; vestiture black, the long joint with a pale ring before the middle, the others white at base above; beneath a line of white scales along entire length of palpi; apical third of the long joint and last two joints with long, dense hairs. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, pale, each with a narrow black ring at insertion of the hair-whorl; hairs long, fine and brown. Coloration similar to the female. Wings narrower than in the female, the vestiture sparse. Abdomen elongate, depressed, parallel-sided; dorsal white bands broader, that on seventh segment much produced at the sides; lateral ciliation long, fine and abundant, pale yellowish. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Genitalia (plate 15, fig. 107): Side-pieces two and one-half times as long as wide, tip conically tapered; marginal filaments subapical at the end of a truncate conical process consisting of three rods with bent tips, a small rod, a leaf-like appendage, and a seta. Clasp-filament moderate, curved, slightly enlarged at base, with an articulated terminal spine. Harpes furcate, the outer branch long, curved, the inner conical, bearing a dense tuft of spines. Harpagones furcate, one branch roundedly forked, the other divided into six irregular blunt coarse teeth.

Larva, Stage IV (plate 102, fig. 338).—Head rounded, widest through the eyes; antennæ long and slender, a tuft at outer third, the part beyond it slender;

Digitized by Google

head-hairs all multiple, rather long. Body with the skin glabrous; lateral abdominal hairs in threes after the second segment; comb of eighth segment of many spines in a patch. Air-tube about five times as long as wide, tapering outwardly, the terminal hooks minute; pecten reaching somewhat over the basal third, of about twelve small teeth; five many-haired tufts on posterior aspect, the basal one well within the pecten, the subapical one moved laterally out of line with the others. Anal segment a little longer than wide, ringed by the plate; dorsal tuft of three hairs of different lengths on each side; lateral hair small, double; ventral brush confined by the chitinous ring. Anal gills about as long as the segment, their tips bluntly rounded, all four of equal length.

The larvæ inhabit stagnant pools, such as occur in the beds of streams that have ceased to flow in the dry season. This is probably their natural habitat, but they take readily to artificial receptacles, such as rain-water barrels, and have doubtless increased in numbers since the advent of man. The eggs are deposited in rafts and the species continues to breed as long as conditions are suitable. The rainy season is probably passed in the adult state and also that part of the dry season after the pools have evaporated.

Southern Oregon, California, probably also in northern Mexico.

Pasadena, California, larvæ in a pond in a lawn (H. G. Dyar); Laguna, California, larvæ in a well-hole by the edge of a lake (H. G. Dyar); San Diego, California, larvæ in an old water-vat (H. G. Dyar); Sweetwater Junction, California, larvæ in pools in a stream-bed (H. G. Dyar); San Luis Obispo, California, larvæ in a pool in a rocky canyon (A. N. Caudell); Avalon, California, larvæ in a water-barrel (H. G. Dyar); Chico, California, larvæ in a horse-trough (A. N. Caudell); Klamath Falls, Oregon, adult captured (Dyar & Caudell).

Culex stigmatosoma has been confounded with *Culex tarsalis*. We have some specimens from Guatemala, collected by Dr. G. Eisen, that much resemble *Culex stigmatosoma;* but their condition is such that we can not make satisfactory determination and the larvæ also are unknown to us.

CULEX EUMIMETES Dyar & Knab.

Culex eumimetes Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 61, 1908.
Culex eumimetes Theobald, Mon. Culic., v, 616, 1910.

ORIGINAL DESCRIPTION OF CULEX EUMIMETES:

Female.—Proboscis moderately long and slender, not swollen at the tip, black-scaled, a rather broad white ring at the middle; palpi slender, black-scaled, the apices white-scaled; occiput clothed with brownish scales with brassy luster; eyes narrowly margined with silvery white, much broadened at the sides; mesonotum bright brown-scaled with brilliant bronzy luster and with traces of pale shining scales along the margins and around the antescutellar bare space; mesially there are two subdorsal spots of pale scales; scutellum pale-scaled; abdomen depressed, dull black-scaled, the segments with rather narrow basal white bands; venter pale-scaled, with obscure apical dark bands; wings with the scales along the veins dark, long and very narrow; legs black; femora with the under surface white-scaled; knees narrowly white-scaled; apices of the tibiæ white-scaled, the inner side of the tibiæ and tarsi with a line of pale scales; tarsi of all the legs white-ringed at both ends of the joints, the rings very broad on the hind legs, the last tarsal joint of the hind legs white with a small black ring; claws simple. Length, 3.5 mm.

Male.—Proboscis rather long, not swollen at apex, white-ringed at the middle; palpi slender, considerably longer than the proboscis, black-scaled, with white annulations, the apical two-thirds clothed with long hairs; head and thoracic markings as in the female; abdomen long and slender, dull black-scaled above, the segments with very broad basal white bands, expanded laterally on the sixth, seventh, and eighth segments; venter pale-scaled, with an indication of subapical dark banding; legs marked as in the female. Length, 3.5 mm.

Digitized by Google

Ten specimens, Orizaba, Mexico, bred from larvæ found in a puddle of drainage water in the suburbs of the city. (F. Knab.)

Type.—Cat. No. 11971, U. S. N. M.

The adult so closely resembles that of *C. stigmatosoma* Dyar that it is almost impossible to distinguish them; but the larvæ are very dissimilar.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX EUMIMETES:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture black, a rather broad, sharply limited white band at middle; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi small, one-fourth the length of proboscis, black, with large white tips. Antennæ with joints subequal, rugose, pilose, black, the second joint slightly enlarged, with a patch of white scales on inner side; tori subspherical, with a cup-shaped apical excavation, yellowish, shading to black within, with a patch of white scales on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, dull black, nude. Eyes black. Occiput black, clothed with narrow, curved scales, which are pale brownish, ocular margin and sides white; many erect serrate-tipped, pale-brownish scales on the nape, those towards the sides black.

Prothoracic lobes elliptical, remote dorsally, luteous, clothed with white scales in the middle and some dark bristles. Mesonotum brown, clothed with narrow, curved bronzy-brown scales with a brassy luster, those along the margins paler and forming two indistinct spots on the disk; ante-scutellar space surrounded by pale scales and a patch of them at root of wing; bristles rather numerous, long, black. Scutellum trilobate, brown, clothed with narrow, curved whitish scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, pale brown, nude. Pleuræ and coxæ pale luteous, with small patches of elliptical, flat white scales and rows of small brown bristles, front coxæ with a patch of blackish scales.

Abdomen subcylindrical, flattened, truncated posteriorly; dorsal vestiture black, a yellowish-white band at base of each segment except the first, narrowing at sides, joining a row of white lateral patches; venter white scaled, with a median series of apical, large black patches.

Wings ample, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant a little more than its own length from anterior cross-vein; scales blackish, the outstanding ones dense, long, linear. Halteres whitish.

Legs slender, long; femora black, white below nearly to tips, knees white; tibiæ black, with a white line on inner side, extreme base and tip narrowly white; tarsi black, each joint with a white band at base and tip; front and mid tarsi with the rings very narrow and present only on first and second joints and base of third. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4.5 mm.

Male.—Proboscis straight, slightly longer than in the female. Palpi long and slender, exceeding the proboscis by nearly the length of the last two joints, last joint pointed, penultimate one slightly enlarged; vestiture black, the long joint with a pale ring before the middle, the others with narrow, basal white bands; beneath a line of white scales; apical half of long joint and last joints with long, dense black hairs. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, each with a narrow black ring at insertion of the hair-whorl; hairs long, fine, brown. Coloration similar to the female. Wings narrower than in the female, the vestiture sparse. Abdomen long, depressed, nearly parallel-sided, the eighth and ninth segments narrowed; white dorsal bands much broader than in the female; lateral ciliation long and fine, pale yellowish. Claw formula, 1.1–1.1–0.0.

Digitized by Google

Genitalia (plate 15, fig. 108): Side-pieces about three times as long as wide, attenuated towards the base; a rounded outer lobe bears 3 rods with hooked tips and a leaf-like appendage; clasp-filament stout, curved, the tip tapering and bearing a terminal claw. Harpes divided, the inner lobe stout, rounded and bearing a crown of spines; outer lobe blade-like, curved. Harpagones divided into numerous lamellæ, their ends forming a group of denticles inwardly. Basal lobes low, broad, setose.

Larva, Stage IV (plate 103, fig. 343).—Head rounded, widest through the eyes, which are upon a lateral expansion; labrum shallowly emarginate between the frontal spines; antennæ large, basal two-thirds rather stout, outer third slender, with a multiple hair-tuft at the notch, two of the terminal hairs slightly basal of the third; upper and lower head-hairs and ante-antennal tuft multiple, long. Skin glabrous. Lateral abdominal hairs multiple on first two segments, in threes on third to fifth, double on sixth. Lateral comb of eighth segment of many spines in a large triangular patch over three rows deep. Air-tube subfusiform, over four times as long as wide; pecten of short, evenly spaced teeth on basal third; four multiple hair-tufts posteriorly, rather short and subequal, a double-haired tuft dorsally of the others, between second and third tufts, and another between third and fourth tufts situated still more dorsally; terminal hooks minute. Anal segment longer than wide, completely ringed by the plate; dorsal tuft of five unequal hairs on each side; lateral hair single, short; ventral brush large, not extending beyond the edge of the chitinous ring. Anal gills four, slender, the upper pair slightly longer than the lower, their tips rounded.

The larvæ evidently live in semi-permanent ground-puddles in the manner of the preceding allied species. Mr. Knab met with the species only once, the larvæ in a puddle of drainage-water in the suburbs of a city.

Mexico.

Orizaba, larvæ in a puddle March 16, adults issued April 3 to 7, 1907 (F. Knab).

The adult is closely allied to *Culex stigmatosoma,* but the larvæ differ sufficiently.

CULEX CORNIGER Theobald.

Culex corniger Theobald, Mon. Culicid., iii, 173, 1903.
Culex lactator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 205, 209, 1906.
Culex hassardii Grabham, Can. Ent., xxxviii, 167, 1906.
Culex basilicus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 169, 1906.
Culex lactator Dyar & Knab, Proc. Biol. Soc. Wash., xix, 170, 1906.
Culex corniger Theobald, Mon. Culicid., iv, 415, 1907.
Trichopronomyia microannulata Theobald, Mon. Culic., iv, 481, 1907.
Culex corniger Peryassú, Os Culicideos do Brazil, 193, 1908.
Culex lactator Busck, Smiths. Misc. Colls., quart. iss., iii, 68, 1908.
Culex corniger Pazos, San. y Ben., ii, 49, 557, 1908.
Culex lactator, var. *lactator* Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 254, 1909.
Culex lactator, var. *loquaculus* Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 254, 1909.
Culex corniger Theobald, Mon. Culic., v, 342, 1910.
Culex lactator Theobald, Mon. Culic., v, 613, 1910.
Culex basilicus Theobald, Mon. Culic., v, 613, 1910.
Culex corniger Lutz, Mem. Inst. Osw. Cruz, iv, 78, 1912.

ORIGINAL DESCRIPTION OF CULEX CORNIGER:

Thorax chestnut-brown, surrounded with creamy scales, which also form an inwardly projecting branch on each side to half-way across the mesonotum; abdomen black, with basal white median patches forming almost bands and basal white lateral spots. Wings with deep brown-scaled veins. Legs black, femora and tibiæ with apical white spots; metatarsi and tarsi with apical and basal banding, most prominent on the hind legs; proboscis black, with an indistinct trace of pale banding.

♀. Head brown, covered with narrow-curved pale golden scales, ochraceous up-

Digitized by Google

right forked scales in the middle and dark ones at the sides, showing as two indistinct dark lateral patches, the scales around the eyes and at the sides very much paler than those on the occiput; clypeus, palpi and antennæ black; proboscis deep brown basally, black towards the apex, with an indistinct pale band on the apical half.

Thorax deep brown, with narrow-curved brown scales, chestnut-brown in some lights, almost bronzy in others, the sides of the mesonotum with a broad band of pale creamy scales, from which springs on each side an inwardly projecting branch half across the mesonotum about its middle; in front of the scutellum are a few grey scales, and on the mid lobe of the scutellum a prominent patch of the same, border-bristles long, rich brown, eleven to the mid lobe; metanotum deep brown; pleuræ paler brown, with a patch of grey scales.

Abdomen black, with basal creamy curved patches scarcely forming complete bands, small basal lateral white spots, which are very prominent on the penultimate segment; on the venter the abdomen has broad basal creamy bands; posterior border-bristles pale, shortest in the middle of each segment. Legs deep brown to almost black, apices of the femora and tibiæ pale, the metatarsi and tarsi with apical and basal pale bands, very indistinct on the fore legs, distinct and broader on the hind legs, except the last tarsal joint, which scarcely shows any banding; ungues small, equal and simple.

Wings with typical brown *Culex* scales; first sub-marginal cell longer and narrower than the second posterior cell, its base considerably nearer base of the wing than of the latter; stem of the first sub-marginal very short, almost as short as in *C. pipiens*, stem of the second posterior about two-thirds the length of the cell; posterior cross-vein a little more than its own length distant from the mid-cross vein; third long vein, also the fifth and sixth and basal portion of the fourth, second and all the costal darker scaled than the rest. Halteres with almost white stem and pale ochraceous knob.

Length.—5.5 mm.

♂. Palpi deep brown, with yellow bands; abdomen with basal white bands; ungues of the fore and mid legs unequal, uniserrated, hind equal and simple.

Length.—5.5 mm.

Locality.—Para, Brazil (Prof. Goeldi); Rio de Janeiro (Lutz).

Time of capture.—30. 8. 02 (Dr. Lutz).

Observations.—Described from two females and a male collected by Prof. Goeldi. It can at once be told by the thoracic ornamentation.

There is another female and three males which show no thoracic ornamentation with a hand lens and which would be mistaken for *C. cingulatus*, F., but careful examination with the microscope shows traces of the ornamentation and also the large number of mid scutellar chaetæ.

Dr. Lutz has also sent me a male and female which he bred, and pointed out at the same time their resemblance to *C. cingulatus*.

ORIGINAL DESCRIPTION OF CULEX LACTATOR:

With the characters given in the table; a very distinct form. The larva contradicts both the characters which usually define the species of *Culex*, but we nevertheless believe that it belongs here. The anal segment has the normal structure of all the *Culex* species.

The larvæ were taken by the junior author in puddles at Cordoba, Santa Lucrecia, Rincon Antonio, Tehuantapec, and Almoloya, Mexico; Puntarenas and San José, Costa Rica. The adults were named "*Culex ? secutor* Theob." and mixed with another species (*C. coronator* D. & K.) under this name. Compare our remarks under *Culex secutor* and *Janthinosoma scholasticus*.

The following is an abstract of the table:

1. Antennæ with the tuft at the middle of the uniformly shaped joint..... 2
2. Air tube only about two-and-a-half times as long as wide..... 4
4. Ring of anal segment broad; pecten over half of tube; two tufts within, two beyond not in line, two on dorsal aspect..... *lactator*

ORIGINAL DESCRIPTION OF CULEX HASSARDII:

♀. Head grayish, with narrow curved pale golden scales and hairs clustered thickly on the occiput and between the eyes, upright forked scales on the nape, sides of the head black, eyes bordered with bright white scales; antennæ, palpi and clypeus black; proboscis black, penultimate quarter of its length banded with yellow scales; apex yellow. Thorax grayish, clothed with numerous elongated spindle-shaped black and white scales; white scales collected in two conspicuous white spots near the centre, and a broad area near the scutellum, also in patches along the borders of the mesothorax, a number of long black hairs especially abundant about the origin

Digitized by Google

of the wings. Prothoracic lobes white-scaled. Central lobe of the scutellum white scaled. Lateral lobes black. Pleura black, with several patches of white scales. Metanotum deep brown. Halteres with pale yellow stems and knobs. Legs bluish-black, clothed with black scales with bluish metallic reflections, all joints faintly banded both apically and basally. Venter of femora and tibiæ pale, with white scales. Apical banding of the hind tibiæ conspicuous; ungues equal and simple. Abdomen black, speckled with grayish scales, base grayish, with black and white scales, two black spots in the centre; second segment with broad basal creamy band expanding in the mid line into a square area; third segment with a narrow crescentic basal creamy area, the following segments unbanded; last two apical segments with faint basal bands. All the abdominal segments bordered apically with long white hairs. Wings densely scaled, veins with thick median and broad lateral scales, especially on the third and fourth long veins. Scales not mottled. The first submarginal considerably longer and narrower than the second posterior cell, stem only one-sixth the length of the cell. Stem of the second posterior slightly larger than half the cell; posterior cross vein rather more than its own length distant from the mid cross vein.

Length, 4–5 mm.

♂.—Scale ornamentation of the head and thorax closely resembling that of the ♀. Palpi exceeding the proboscis by the two terminal joints; terminal joints hairy and somewhat swollen, bearing many long hairs in a row on each side; apex and base of the terminal joint white-scaled, penultimate joint basally banded; on the venter, a little below the apex, there is a white scaled area. Antepenultimate joint with two bands of white scales, the distal broader one a short interval below the apex, at a point corresponding to the band on the proboscis; the narrow basal band a short distance above the base; a row of black hairs along the inner aspect; apical region somewhat inflated. Abdomen, base white, with two central black spots; second segment with broad basal band expanding laterally into wide areas, also centrally into two divergent rounded areas. Third and following segments with basal bands expanding at the sides; scales of all the lateral areas brighter than those in the middle portion of the bands, which are creamy; two white spots in the center of the third and succeeding segments. Appendages of the basal segment of clasp composed of a leaf-like organ and a broad flattened hooked spine, also three simple straight spines. Apical segment terminating in two blunt teeth. Ungues of the fore and mid legs uniserrated and unequal, of the hind equal and simple.

Length, 4–5 mm.

The following points were noted in the adult LARVA: Antennæ short, truncate, nearly straight, smooth, entirely devoid of spines. Lateral tuft represented by one short hair. A short lamella and several short spines at the apex. Labial plate columnar, lateral teeth strongly curved, upper nearly straight. Air tube short, a little longer than broad (at the base), subconical; row of pecten of eight curved and spinous teeth, their serrations reduced to a row of fine elongated spicules. Eight pairs of four-fid hairs are attached to the central region of the tube posteriorly, forming a characteristic cluster. Scales of comb 15–20, each consisting of a thin oval basal plate bordered with fine radiating hairs. Terminal portion of the ninth segment completely encircled by a ring of chitin. Terminal tufts of hairs springing from distinct plates; the upper tuft of only two pairs of hairs, the lower of seven pairs, the latter feathered. Anal papillæ very long narrow cylindrical, relatively larger than those of any other Jamaican Culicid; papillæ stiffened with fine spiral chitinous threads.

Pupa: Siphons short, apertures bordered internally by many fine branching hairs. Terminal appendages broad, segments nearly equal; mid rib extending as a fine hair a short distance from the free margin.

OBSERVATIONS.—A few living larvæ of this species, with some of *Culex secutor*, Theob., were sent in September, 1905, by Major Hassard, after whom I have named the species, collected by him from a tank at Newcastle. They were easily distinguished by their pale straw-coloured bodies and dark heads and siphons. The singular group of hairs at the back of the siphon, and the very long anal papillæ at once attracted attention. In January, 1906, I found some specimens in a water barrel at the Government Botanic Garden at Castleton, alt. 500 feet, living harmoniously with *Stegomyia fasciata*, Fab. The adult insects bred from these bit vigorously. I have placed this species provisionally in the genus *Culex;* the characters of the larval siphons and antennæ clearly point to its being an aberrant form.

ORIGINAL DESCRIPTION OF CULEX BASILICUS:

♀. Proboscis black with a broad, dull white ring; antennæ and palpi black; head with light golden yellow scales behind. Thorax black with brown-black scales centrally; along the sides of disk a band of light yellow scales with a narrow square

Digitized by Google

central projection into the disk; a square patch of same color behind, and on scutellum; pleuræ whitish, marked, with black above, centrally and on the bases of the legs. Abdomen black with central basal white spots on the first four segments, pale terminal hairs on all the segments; venter with short, broad white basal segmentary bands. Legs black, femora pale beneath, tips of femora and tibiæ white, tips and bases of the tarsal joints very narrowly white. Wings with narrow scales.

The larvæ fall in the table with *janitor* and *lactator* (Journ. N. Y. Ent. Soc., xiv, 205, 1906), but differs in having the ring of the anal segment broad; pecten of eight spines reaching to middle of the air tube; one tuft within the pecten, three beyond it, not in line, two tufts on the dorsal aspect of the tube, all the tufts 2-haired only, thick and coarse.

Five specimens, bred by Mr. Urich from larvæ in a tub near the kitchen at Arima, Trinidad.

Type.—Cat. No. 10,021, U. S. Nat. Mus.

ORIGINAL DESCRIPTION OF TRICHOPRONOMYIA MICROANNULATA:

Head brown, pale scaled; proboscis with pale band. Thorax deep fawn-coloured with bright brown scales, two median bare paler lines which converge posteriorly, a curved one on each side, in front of wings. Abdomen deep brown with basal yellow spots to the segments. Front and mid legs brown, unbanded, hind with faint banding involving both sides of joints.

♂. Head brown with narrow-curved pale scales, pale upright forked scales in the middle, dark at the sides, flat creamy-white lateral scales, a line of small ones spread partly around the eye borders; proboscis deep brown, enlarged on the apical half, a narrow pale band on the apical half, below which are longish hairs on each side decreasing in size to the base. Palpi brown, deep blackish apically, acuminate, the apical segment longer than the penultimate, hair-tufts on the last two and apex of the ante-penultimate black; the dark apical portion shows deep violet reflections.

Thorax brown, adorned with scanty narrow-curved bright golden-brown scales, the denuded surface shows darker and paler lines, a paler curved one on each side in front of the roots of the wings, two median darker ones which converge posteriorly (the effect being quite different under the microscope to under a hand-lens), chætæ over the roots of the wings brown; the scales are paler in front of the scutellum, which is also clothed with narrow-curved pale scales and with eight posterior border-bristles to the mid lobe; metanotum bright brown; pleuræ pale silvery grey.

Abdomen shiny black, clothed with deep brown scales with dull violet black reflections, each segment with a basal median creamy-yellow spot, basal segment all dark and the last two with almost complete basal bands, hairs brown. Genitalia with large claspers very broad at the base becoming finer apically with a lateral apical expanding segment; lateral process of basal lobe with three large spines, the two largest with fine bent tips, the third acuminate, a leaf-like plate and then a smaller spine.

Legs deep brown; the hind pair with apex of tibiæ, first, second and third tarsals very narrowly pale banded, the pale scales to some extent involving both sides of the joints, traces of this banding seen in fore legs and still less on the mid; fore and mid ungues unequal, both uniserrate, the smaller with a tooth close to base; hind equal and simple.

Wings with rather dense moderately large lateral scales, especially on the branches of first fork-cell; first fork-cell longer and narrower than the second posterior cell, its base a little nearer the base of the wing, its stem about one-third the length of the cell; stem of the second posterior nearly two-thirds the length of the cell; supernumerary and mid-cross veins united, both bending in towards the base of the wing, the posterior cross-vein about twice as long as the mid about one and a half times its own length distant from it; halteres with dusky pallid stem, the knob dark inside.

Length.—6 mm.

Habitat.—Stanley Town, New Amsterdam (Dr. Rowland).

Time of capture.—July.

Observations.—Described from a single perfect male.

It is somewhat obscure, but the hairy banded proboscis will at once separate it from the species of *Culex* which it resembles and places it in the genus *Trichopronomyia.*

It differs from *T. annulata* in not having a banded abdomen.

ORIGINAL DESCRIPTION OF CULEX LOQUACULUS:

In this form the pale markings are all reduced, the tarsal rings smaller than in normal *lactator* and of a brownish shade; the proboscis instead of being ringed is white-marked on the under side.

Digitized by Google

Type no. 12050, U. S. N. M.

We have selected six specimens as types from the Panama Canal Zone.

Culex lactator is a common tropical mosquito, the adult variable, but the larvæ constant. We have been obliged to recognize named varieties in this case, since the extremes are so different from the normal form as to fall very differently in any synoptic table. These forms would certainly be treated as distinct species by any student studying the adults alone.

ORIGINAL DESCRIPTION OF CULEX LACTATOR, VARIETY LACTATOR:

Our *Culex lactator*, described from larvæ, proves to be very variable as adult. We propose to restrict our name to that form of *lactator* in which the legs are entirely black and the proboscis lacks the white ring, being only white-marked beneath, leaving the name *hassardii* Grabham for the normally fully marked form.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX CORNIGER:

SYNOPSIS OF VARIETIES.

Abdomen with basal segmental pale bands:
- Proboscis and tarsi distinctly white-ringed..... *hassardii* Grabham
- Proboscis unbanded, tarsi narrowly white-ringed..... *loquaculus* Dyar & Knab
- Proboscis and tarsi black, unbanded..... *lactator* Dyar & Knab

Abdomen with segmental dorsal spots..... *corniger* Theobald

Female.—Proboscis moderate, rather thick, uniform, labellæ conically tapered; vestiture black, with a blue reflection towards tip; a broad dull-whitish ring beyond the middle, ill-defined towards its base, setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, black, one-fourth as long as proboscis, with some outstanding setæ at base. Antennæ moderate, joints subequal, rugose, pilose, black, second joint scarcely enlarged, pale at base; tori subspherical, with a cup-shaped apical excavation, pale yellowish, brown on inner side, with a few short hairs; hairs of whorls sparse, black, and rather short. Clypeus triangular, convex, brown. Eyes black. Occiput black, clothed with narrow, curved pale-yellow scales, flat white ones on lower part of sides; margin of eyes white; a patch of black scales on sides; numerous erect, forked or serrate-tipped yellowish scales dorsally.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow, curved whitish scales and a few black bristles. Mesonotum brown, vestiture of dense, narrow curved scales, dark shining bronzy-brown on disk, shining yellowish on lateral margins, broadened on anterior angles, a spot on each side of middle of disk, a stripe on each side of ante-scutellar bare space; bristles brown, rather short. Scutellum trilobate, pale, brown, clothed with narrow yellowish scales, each lobe with a tuft of black bristles. Postnotum elliptical, luteous brown, nude. Pleuræ luteous, shaded with blackish, not forming a defined band; with patches of elliptical, flat white scales, and rows of small pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; clothed dorsally with black scales, with a slight metallic reflection; first segment with a patch of black scales in the middle, the succeeding ones with yellowish-white basal segmental bands, that on second segment forming a central patch, a row of lateral, triangular, basal segmental white spots joined to the bands; venter clothed with yellowish-white scales, tips of segments with broad black bands.

Wings moderate, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell rather shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins brown, linear. Halteres whitish.

Legs: femora black above, white beneath nearly to tips, tips white; tibiæ black, tips yellowish white, a line of pale scales on inner side; tarsi black with very small whitish rings at both ends of the joints. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wings 3.5 mm.

Male.—Proboscis straight, longer and more slender than in the female, black, with a small white ring beyond the middle. Palpi exceeding the proboscis by

Digitized by Google

nearly the length of last two joints, which are slightly enlarged; last joint tapered; vestiture black, with a broad white ring at base of each joint, apex of last one, and a spot on under side of penultimate joint pale, a narrow pale ring at basal third of long joint, a broad, diffuse, pale band at apical third; a few short black hairs on last two joints and tip of long joint. Antennæ plumose, with the last two joints long and slender, rugose, pilose, black, the others short, whitish, a black ring at insertions of hair-whorls, the hairs long, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells scarcely longer, vestiture sparse. Abdomen long, subdepressed, nearly parallel-sided; dorsal white bands very broad, laterally expanded on sixth and seventh segments, eighth segment nearly wholly white-scaled; lateral ciliation long and fine, abundant, pale yellowish. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wings 3.5 mm.

Genitalia (plate 17, fig. 127): Side-pieces twice as long as wide, the tips conically tapered, a subapical, rounded, truncate prominence bearing two rods with curved tips and a leaf-like appendage; clasp-filament moderate, slender, with an articulated terminal spine. Harpes divided, outer branch stout, bent at tip and densely spined, inner branch bent over; harpagones divided, inner branch cleft at tip into four partitions.

Larva, Stage IV (plate 103, fig. 342).—Head rounded, roundedly expanded in region of eyes, a strong notch at insertion of antennæ, the front margin arcuate; antennæ moderate, smooth, uniform, a small hair a little beyond the middle; at apex a hair, a short hair, a spine, and a digit on a pedicel; both pairs of dorsal tufts in threes, placed in line transversely; ante-antennal tufts multiple. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter; hairs coarse, the lateral tufts multiple on first two segments, double on third to sixth; body minutely pilose. Mental plate triangular, steep on sides; a central tooth and 12 on each side, all exactly alike and sloping gradually to the steep sides; three small teeth on the sides. Mandible quadrangular, slightly spined without at base; two filaments before tip and two very short ones; an outer row of cilia from a collar; a row of conical prominences along the outer margin, each bearing a small tuft of hair and a slender filament; dentition of four teeth on a process, the first longest; a long spine before, a very large, broad filament with coarsely-serrate margined six-feathered hairs within; process below tapered outwardly, obscurely furcate with patches of hair; basal angle nearly obsolete; a row of stout hairs within; three long basal hairs. Maxilla irregularly hemispherical, divided by a suture; inner half with two rows of cilia; a row of hairs at apex, which is granular; outer half with two stout filaments next suture, a row of hairs running down from apex, a slender spine near middle, some slight cilia basally. Palpus short and stout, with four minute apical digits. Air-tube conically tapered, about two and a half times as long as wide; pecten teeth rather sparse, running beyond the middle; single tooth a long spine with about seven delicate basal branches; three tufts on posterior margin, two of them within the pecten, a fourth displaced tuft before outer tuft, two more on the dorsal aspect. Lateral comb of eighth segment of many spines in a long triangular patch; single spine elongate elliptical, fringed with small spinules. Anal segment a little longer than wide, ringed by a large plate spined on its posterior margin; dorsal tuft of two long hairs; a small lateral hair; ventral brush well developed, posteriorly situated. Anal gills long and broadly lanceolate.

The larvæ live in ground-pools, tree-holes, etc., and occasionally take to artificial receptacles, but are not especially domestic. Mr. Knab obtained them in puddles, pools, and ditches, an old tank, and a pot-hole in a stream-bed; Mr.

Digitized by Google

Busck found them in pools and edges of streams, a swamp, hollow tree, a banana-stump, a barrel, a wash-tub, and old tin cans; Mr. Jennings got them in the edges of streams, swamps, and reservoir, in a hollow banana-stump, and hole in a "cedar" stump, in an old kettle, and an old tin, in a pool of salt water, and in a crab-hole. According to Dr. A. Lutz the female adult does not suck blood, and lacks the mandibles.

Mexico, Central America, the Antilles, southern Florida, Trinidad, and South America to Brazil.

Orizaba, Mexico, March 31, 1908 (F. Knab); Córdoba, Mexico, June 10, 1905 (F. Knab); Santa Lucrecia, Mexico, June 19, 1905 (F. Knab); Rincon Antonio, Mexico, June 23, 1905 (F. Knab); Tehuantepec, Mexico, July 2, 1905 (F. Knab); Almoloya, State of Oaxaca, Mexico, July 21, 1905 (F. Knab); "Las Loras," near Puntarenas, Costa Rica, September 9, 1905 (F. Knab); Knights Key, Florida, December 2, 1908 (W. H. Sligh); Havana, Cuba, December 6, 1908 (W. H. Sligh); Kingston, Jamaica (M. Grabham); Santo Domingo, August 22, 1905 (A. Busck); Arima, Trinidad (F. W. Urich); Pedro Miguel, Canal Zone, Panama, April 24, 1907 (A. Busck); Tabernilla, Canal Zone, Panama, April 27, 1907 (A. Busck); Las Cascadas, Canal Zone, Panama, May 15, 1907 (A. Busck); Gatun, Canal Zone, Panama, June 8, 1907 (A. Busck); Ahorca Lagarto, Canal Zone, Panama, June 12, 1907 (A. Busck); Lion Hill, Canal Zone, Panama, July 26, 1907 (A. Busck); Pedro Miguel, Canal Zone, Panama, November 19, 1907 (A. H. Jennings); Corozal, Canal Zone, Panama, November 30, 1907 (A. H. Jennings); Panama City, Panama, December 2, 1907 (A. H. Jennings); Miraflores, Canal Zone, Panama, December 10, 1907 (A. H. Jennings); Bas Obispo, Canal Zone, Panama, December 12, 1907 (A. H. Jennings); Rio Grande, Canal Zone, Panama, December 14, 1907 (A. H. Jennings); Empire, Canal Zone, Panama, December 20, 1907 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, January 19, 1908 (A. H. Jennings); Paraiso, Canal Zone, Panama, February 25, 1908 (A. H. Jennings); Culebra, Canal Zone, Panama, April 3, 1908 (A. H. Jennings); Cascajal River, Panama, May 30, 1908 (A. H. Jennings); Gatun, Canal Zone, Panama, June 23, 1908 (A. H. Jennings); Ancon, Canal Zone, Panama, August 9, 1908 (A. H. Jennings).

Reported also from São Paulo, Brazil (Theobald); Rio de Janeiro, Brazil (Peryassú); Bahia, Brazil (Lutz); State of Minas Geraes, Brazil (Peryassú).

Culex corniger is a very variable species; we recognize four forms that are worthy of varietal names. All of the species of *Culex* are more or less variable in the adult characters, but this one is the most so of any with which we are familiar. The larvæ, however, are very constant, and are without any close allies. The description of *Culex basilicus*, referred to the synonymy above, is due to an error of observation, the hairs on the air-tube of the specimens under observation having become united in pairs. These same specimens, reëxamined at a later date, show the ordinary four-haired condition. The original condition was due to some peculiarity in the fluid in which the skins had been preserved, and disappeared when the vials were refilled. We are able to make use of nearly all the other names proposed to designate the varieties. The genus *Trichopronomyia* was founded upon the presence in the male of a tuft of hairs upon the proboscis near its middle. This is probably always present in *Culex corniger*, but it is seldom evident, as it is a delicate structure, easily abraded, and moreover not always erected in a conspicuous manner, even when present. We were obliged to examine a number of specimens before noting its presence. We have seen the structure in other species of *Culex;* it clearly has no generic value and is even unreliable as a specific character, owing to its deciduousness.

Digitized by Google

CULEX ELOCUTILIS Dyar & Knab.

Culex elocutilis Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 255, 1909.

ORIGINAL DESCRIPTION OF CULEX ELOCUTILIS:

FEMALE.—Proboscis moderately long and slender, somewhat swollen towards the apex, black-scaled; palpi black-scaled. Occiput clothed with dark scales with bronzy luster, margin of the eyes narrowly white. Mesonotum uniformly dark brown-scaled with a bronzy luster, the scales on the scutellum paler. Abdomen depressed, truncate at tip, dark-scaled above with distinct coppery luster, the anterior angles of the segments laterally silvery white-scaled; beneath with basal segmental silvery bands. Wing-scales dark brownish, long and narrow. Legs bronzy brown, the apices of the hind tibiæ and the bases of the first, second, and third tarsal joints very narrowly pale-marked; claws simple. Length, 3 mm.

MALE.—Palpi longer than the proboscis, entirely black-scaled; coloration as in the female. Length, 2.5 mm.

Two specimens, Coscojar River, Porto Bello Bay, Panama (A. H. Jennings).

Type no. 12051, U. S. N. M.

DESCRIPTION OF FEMALE AND MALE OF CULEX ELOCUTILIS (LARVA UNKNOWN):

Female.—Proboscis rather long, swollen towards apex, labellæ conically tapered; vestiture black, with a blue reflection towards tip; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, black, one-fourth as long as proboscis, with some outstanding setæ at the base. Antennæ moderate, the joints subequal, rugose, pilose, black, second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous; hairs of whorls sparse, black, moderate. Clypeus rounded triangular, convex, brown. Eyes black. Occiput brown, clothed with narrow curved scales on vertex, flat ones on sides, pale brownish, margin of eyes and cheeks dull white scaled; numerous erect, forked black scales on nape.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow curved scales and a few blackish bristles. Mesonotum brown, with two bare impressed lines, vestiture of narrow, curved, uniformly bronzy-brown scales; bristles black, long. Scutellum trilobate, brownish luteous, clothed with narrow, curved pale-brownish scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ pale green, without black bands; small patches of elliptical white scales and rows of short pale bristles.

Abdomen subcylindrical, depressed, truncate at tip, clothed dorsally with black scales with a strong coppery luster, ends of segments with rather coarse pale bristles; a row of lateral segmental, basal, triangular small white spots; venter clothed with dull-white scales, tips of segments with broad black bands.

Wings moderate, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins dull brown, those on costa blackish with blue luster, the outstanding ones linear, denser towards tip of wing. Halteres whitish.

Legs: Femora black above, white beneath nearly to apex, tips very narrowly white; tibiæ bronzy brown, with a blue reflection, apices narrowly whitish; tarsi black with blue reflection, first, second, and third joints of hind pair with very narrow basal white rings; the tarsi show a strong pale-brassy luster which in certain lights causes the white rings to become invisible; fore and mid legs with the tarsi entirely black. Claw formula, 0–0.0–0.0.

Length: Body about 3 mm.; wing 3.4 mm.

Male.—Proboscis straight and slightly longer than in the female. Palpi exceeding proboscis by more than length of last joint, penultimate joint slightly thickened, last joint slender; vestiture of black scales, apex of long joint and the last two joints with long black hairs. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others rather short, whitish, with black

Digitized by Google

rings at insertions of hair whorls; hairs long, brown. Coloration similar to the female. Wings narrower, the stems of the fork-cells longer, vestiture sparse. Abdomen moderately hairy on the sides, the hairs long; lateral segmental spots larger than in the female, tending to form basal bands. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 3 mm.

Genitalia (plate 14, fig. 101): Side-pieces about three times as long as wide, somewhat attenuated towards the base, a low, rounded outer lobe bears three rods with hooked tips, a leaf-like appendage, and a seta; clasp-filament moderate, uniform, with a small terminal claw. Harpes divided, the inner lobe stout, rounded, with a crown of spines, outer lobe blade-like, curved. Harpagones divided into numerous lamellæ, their inner angles forming a group of denticles.

The larvæ live in the water in hollow trees and similar locations. Mr. Jennings found them in a hole in the center of a large "cedar" stump near the banks of a river. The stump was newly cut, the water foul and highly colored. Unfortunately no specimens were preserved. The larvæ were associated with those of *Lutzia bigotii*.

Panama.

Cascajal River, 2.5 miles from its mouth, in Porto Bello Bay, Panama, bred from larvæ, May 30, 1908 (A. H. Jennings).

CULEX TÆNIOPUS Dyar & Knab.

Culex tæniopus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 100, 1907.
Culex tæniopus Busck, Smiths. Misc. Colls., quart. iss., lii, 69, 1908.
Culex tæniopus Theobald, Mon. Culic., v, 614, 1910.

ORIGINAL DESCRIPTION OF CULEX TÆNIOPUS:

Proboscis and palpi black; thorax dark brown with black and ochraceous scales, not forming a defined pattern; abdomen with dark scales bluish luster and brown hairs, unbanded above; legs black, with broad white rings on the tarsi, involving both ends of the joints, the last tarsal joint wholly white. Wings with brownish scales on the veins, not very dense.

One ♀, Bluefields, Nicaragua (W. F. Thornton).

***Type*.—Cat. No. 10260, U. S. Nat. Mus.**

DESCRIPTION OF FEMALE OF CULEX TÆNIOPUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, subcylindrical, slightly expanded at tip, labellæ conically tapered; vestiture blackish; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter, rugose, densely pilose, dark brown; tori subspherical, with a cup-shaped apical excavation, blackish brown; hairs of whorls sparse, moderate, black. Clypeus roundedly triangular, doubly excavated at base, blackish, nude. Eyes black. Occiput brown, with narrow, curved bronzy-brown scales on vertex, broad, flat ones on lower part of sides, black, the margin of eyes broadly white-scaled laterally, narrowly above; many erect, forked black scales on the nape; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with dark bristles. Mesonotum dark brown anteriorly, with two dorsal impressed bare concolorous lines; vestiture of narrow, curved, lustrous dark-brown scales and rows of black bristles. Scutellum trilobate, dark brown, clothed with narrow, curved bronzy-brown scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ brown, with rows of dark bristles and patches of white scales.

Abdomen subcylindrical, truncated at tip; dorsal vestiture dark brown, with a bronzy or blue-black reflection; a row of pale bristles at tip of each segment; a row of small, lateral, basal segmental, whitish triangular patches; venter black-scaled, with narrow, white, basal segmental bands.

Digitized by Google

Wings moderate, hyaline; petiole of second marginal cell less than one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales brown, those on costa darker with a bronzy luster, the outstanding ones moderately dense, ovate, denser apically.

Legs moderate, the femora whitish beneath nearly to tip; knees broadly silvery white; tibiæ and tarsi brown with a bluish reflection; hind tarsi white-ringed at both ends of joints, the rings broad, last joint entirely silvery white; front and mid tarsi unbanded. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

The larvæ live probably normally in water in tree-holes. Mr. Jennings bred a specimen from pools in rocks along the course of a stream in a forest. The pools contained dead leaves, flower-petals, etc. Many larvæ of *Anopheles eiseni* were associated, and also an undescribed species of *Culex* of which only a single male was bred.

Panama and Nicaragua.

Caldera Island, Porto Bello Bay, Panama, larvæ in rock-pools along the stream supplying the reservoir, May 29, 1908 (A. H. Jennings); Bluefields, Nicaragua (F. W. Thornton); Panama (———).

We have only a single breeding record for *Culex tæniopus*, and that from a rock-pool, but infer it to be a tree-hole inhabiting form from the fact that it was associated with *Anopheles eiseni*. It may, of course, be not confined to such locations.

CULEX STENOLEPIS Dyar & Knab.

Culex stenolepis Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 60, 1908.
Culex stenolepus Theobald, Mon. Culic., v, 616, 1910.

Original Description of Culex stenolepis:

***Female.*—Proboscis rather long and slender, black-scaled, labellæ pale-scaled; palpi entirely black-scaled; occiput clothed with pale brownish scales, with brassy luster, the margin of the eyes narrowly white-scaled, broadened into a patch at the sides, numerous erect forked scales particularly basally; mesonotum deep brown-scaled, with bronzy luster and mottled with patches of brassy scales; these scales are most conspicuous along the margins and form two oblique subdorsal bars; anteriorly they form a dorsal patch and are also abundant around the antescutellar bare space and the bases of the wings; scutellum covered with brassy scales; abdomen depressed, truncate at the tip, dull black-scaled above, with narrow white basal segmental bands; beneath the basal bands occupy about half of each segment; wings with the veins clothed with brownish long and very narrow scales; legs black; femora white-scaled beneath except the apical portion; knees white-scaled; tibiæ with their apices pale-scaled, a line of pale scales along their inner surfaces; tarsi of all the legs white-ringed at base and apex of each joint, the front legs very narrowly so, on the hind legs very broadly; last tarsal joint of the hind legs entirely white-scaled; claws simple. Length, 3.5 mm.**

***Male.*—Proboscis long, rather slender, black-scaled, with a white ring around the middle, the labellæ pale-scaled; palpi long, exceeding the proboscis, slender, clothed with black scales, narrowly annulated with white, the apical half covered with long black hairs; head and thorax marked as in the female; abdomen deep black-scaled above, without luster, the basal segmental white bands much broader than in the female; legs marked as in the female. Length, 4 mm.**

Forty-seven specimens, Córdoba, Mexico, bred from larvæ in water between the leaves of bromeliaceous plants (F. Knab).

***Type.*—Cat. No. 11970, U. S. N. M.**

Description of Female, Male, and Larva of Culex stenolepis:

Female.—Proboscis moderate, uniform, labellæ conically tapered; vestiture black, with a brownish luster on median portion; setæ small, curved, black, those on labellæ more prominently outstanding. Palpi short, rather prominent, one-fourth as long as proboscis, clothed with roughened black scales and rather bristly setæ. Antennæ with the joints subequal, rugose, pilose, black, the second

Digitized by Google

joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, yellowish, brown on inner side. Clypeus rounded triangular, brown, nude. Occiput dark brown, clothed with narrow curved scales on vertex, broader ones on sides, pale brownish, shining, those at sides and along margin of eyes white; many erect, forked black scales on nape; setæ along margins of eyes rather long, curved, black. Eyes black.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with shining white scales and dark bristles. Mesonotum dark brown, with two narrow impressed lines, vestiture of bronzy-brown and brassy scales, the latter being arranged along the margins and anteriorly along the median line; two oblique subdorsal lines, a patch over root of wing and an area around ante-scutellar space of similar scales, the pattern rather indistinct. Scutellum trilobate, pale brown, clothed with pale-brassy scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, brown, slightly pruinose. Pleuræ brownish with darker mottlings, with patches of white scales and rows of brown bristles; coxæ pale greenish, the anterior pair with brown scales.

Abdomen subcylindrical, depressed, truncate posteriorly; dorsal vestiture of dull black scales, the segments with very narrow, almost obsolete basal white bands joining large lateral, basal, triangular white patches; tips of segments with pale hairs; venter white-scaled, with black apical segmental bands.

Wings moderate, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales of veins brownish, those on costa darker and with a bronzy luster, the outstanding ones long and linear, rather dense, particularly towards the tip. Halteres pale, with brownish knobs.

Legs moderate; vestiture blackish, femora whitish beneath nearly to tip, knees white; tibiæ black, bases and apices white, a white line on inner side; tarsi blackish, with a bronzy luster, hind tarsi with broad basal and apical white bands on first four segments, last joint entirely white; fore tarsi with white spots at both ends of first two and base of third joint, mid tarsi with bands instead of spots. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

Male.—Proboscis straight, longer than in the female, slightly thickened towards apex, black scaled, a white ring at middle, labellæ pale. Palpi exceeding the proboscis by the length of last joint, slender, penultimate joint slightly thickened, last one tapering at tip; apical third of long joint and last two joints with numerous long black hairs; vestiture of black scales, long joint with a narrow white ring before the middle, last two joints with basal white rings. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, narrowly ringed with black at insertion of hair-whorls; hairs of whorls long, dense, black. Coloration similar to the female, the brassy scales of mesonotum more abundant; basal abdominal bands broad, laterally expanded on seventh and eighth segments. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparse. Abdomen densely hairy at sides. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 14, fig. 97): Side-pieces over twice as long as wide, the tips conically tapered; a small truncate prominence before the tip bearing three rods, a leaf-like appendage, and a seta. Clasp-filament moderate, rather stout, tapered at tip, bearing a small articulated terminal spine. Harpes and harpagones divided, lamellar, the harpes with a crest of dense spines on the arm. Basal appendages small, remote, setose.

Digitized by Google

Larva, Stage IV (plate 103, fig. 341).—Head rounded, wider than long, transversely elliptical; antennæ long, stout, more slender on the outer third, the hair-tuft from outer third large, the terminal spines long; dorsal head-hairs multiple, long. Abdomen with the skin glabrous, the lateral tufts multiple on first two segments, in twos on third to sixth. Lateral comb of eighth segment of rather few spines sparsely set in a patch three rows deep. Air-tube tapered on outer half, about six times as long as wide, the terminal hooks minute; pecten of about ten short, evenly spaced teeth on basal third of tube; three hair-tufts along posterior margin, two more between the outer two of these, situated more dorsally, one considerably dorsal of the other, all the tufts two-haired except the outermost, which is three-haired. Anal segment longer than wide, ringed by the chitinous plate; dorsal tuft of four hairs of different lengths on each side; lateral hair short, double; ventral brush large, confined by the chitinous plate. Anal gills long, tapering, equal.

The larvæ live in the water between the leaves of Bromeliaceæ. Mr. Knab collected them in three instances in such situations. In a coffee-grove, three plants were removed from a mango tree about 20 feet from the ground. One contained no water; another contained this species associated with *Wyeomyia abebela;* the third was much choked with rubbish and contained this species without other mosquito larvæ. On the same tree other bromelias were growing at a height of 50 feet, from one of which this species was obtained, associated with *Culex rejector* and *Megarhinus superbus.* The larvæ grew rapidly.

Mexico.

Córdoba, larvæ from bromelias, March 17 and 21, 1908 (F. Knab).

Culex stenolepis does not agree in its characters with the species of *Culex* which are regular inhabitants of Bromeliaceæ, either in adult or larval characters. Nevertheless, such appear to be its habits; we have received the species from no other locations. Mr. Knab notes that the larvæ developed rapidly, which is also at variance with the habits of the normal bromelia inhabitants. The species is evidently a peculiar one.

CULEX PINAROCAMPA Dyar & Knab.

Culex pinarocampa Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 59, 1908.
Culex pinarocampa Theobald, Mon. Culic., v, 616, 1910.

ORIGINAL DESCRIPTION OF CULEX PINAROCAMPA:

Female.—Proboscis moderately long and slender, not distinctly swollen at the tip; black-scaled above and beneath; palpi black-scaled; occiput clothed with recumbent whitish and bronzy brown scales and with upright dark forked ones; the whitish scales form a margin to the eyes, a median line and large lateral patches; mesonotum bronzy brown-scaled, with several spots of light scales—a pair of median subdorsal spots, a pair farther forward at the lateral margin, another pair above the roots of the wings; the front margin is light-scaled, as also the margin of the antescutellar bare space; scutellum light-scaled, with a brassy luster; abdomen above black-scaled, with bluish luster, the segments with narrow basal bands, which are broadened mesially on all but the last two segments; on the last three segments the bands are expanded toward the lateral margins; ventrally the abdomen is pale-scaled, the apices of the segments obscurely dark-banded; femora dark-scaled above, light-scaled beneath nearly to the apices, knees yellowish white-scaled; tibiæ yellowish white-scaled at bases and apices, tarsi of all the legs with the first, second, third, and fourth joints yellowish white-ringed at bases and apices; mid and hind legs with the fifth tarsal joint entirely yellowish white-scaled; last tarsal joint of the fore legs in part obscurely bronzy-scaled; wings with the scales along the veins dusky, long, and very narrow; claws simple. Length, 5.5 mm.

Male.—Proboscis stouter than in the female, black-scaled, with a white mark on the ventral surface before the middle; palpi long and slender, dark-scaled, longer than the proboscis, with narrow yellowish white annulations, more than half of the apical portion clothed with long hairs; head and thoracic markings as in the female; abdomen long and slender, black-scaled above, with clear white basal segmental

Digitized by Google

bands, broader than in the female, the eighth segment nearly entirely white-scaled; venter light-scaled, with apical dark bands, lateral margins of the abdomen with numerous long pale cilia; tarsi marked as in the female. Length, 5 mm.

One hundred and seventeen specimens, Córdoba, Mexico, bred from larvæ in puddles along the Rio San Antonio. (F. Knab.)

Type.—Cat. No. 11968, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX PINABOCAMPA:

Female.—Proboscis moderate, uniform, labellæ conically tapered; vestiture black, a long patch of pale scales beneath near the middle; labellæ pale; setæ small, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth the length of the proboscis, clothed with blackish scales; some rather bristly setæ. Antennæ with the joints subequal, rugose, pilose, black, second joint slightly enlarged; hairs of whorls short, sparse; tori subspherical, with a cup-shaped apical excavation, brownish luteous, dark on inner side. Clypeus rounded triangular, blackish brown, nude. Occiput dark brown, clothed with narrow, curved scales on the vertex, flat ones on the sides, pale yellowish brown, those at the sides and narrowly along margin of eyes white; many erect, brown, forked scales on the nape, denser on sides; setæ along margin of eyes moderate, black. Eyes black.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with narrow, curved white scales and many black setæ. Mesonotum dark brown, with two narrow impressed bare lines dorsally; vestiture of narrow, curved, dark bronzy-brown scales, some pale brassy ones along lateral and anterior margins, around antescutellar space, and in a pair of subdorsal spots over roots of wings; bristles rather coarse and abundant. Scutellum trilobate, pale brown, clothed with narrow, curved, pale-brassy scales, each lobe with a group of coarse brown bristles. Postnotum elliptical, prominent, brown, nude, shining. Pleuræ brown, with patches of flat white scales and rows of short brown bristles; coxæ luteous, some white and brownish scales on anterior pair.

Abdomen subcylindrical, depressed, truncate posteriorly; dorsal vestiture of dull-black scales, the segments, except the first, with narrow basal white bands, enlarged into triangular patches at the sides; venter yellowish-white scaled, the last three segments with apical dark bands.

Wings moderate, hyaline; petiole of second marginal cell less than half the length of its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein a little more than its own length distant from anterior cross-vein; scales brown, those on costa darker with a bluish reflection, the outstanding ones linear, much denser on fork of second vein. Halteres pale, with brownish knobs.

Legs moderate; femora black-scaled, whitish scaled beneath nearly to tip, knees yellowish-white scaled; tibiæ black-scaled, pale at bases and apices, with a line of pale scales on inner side; tarsi with all the joints yellowish-white scaled at bases and apices, broader on hind legs than on other two pairs, last joint of hind tarsi entirely white, that of front and mid tarsi appearing entirely pale in some lights, in others bronzy brown. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4.5 mm.

Male.—Proboscis straight, uniform, black scaled, with a rather broad whitish ring beyond the middle. Palpi exceeding the proboscis by more than the length of last joint, black scaled, with bronzy luster; long joint with a narrow pale ring at basal third; outer third of long joint and last two joints with numerous long black hairs. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, narrowly ringed with black at insertions of hair-whorls; hairs long, dense, brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, vestiture less

Digitized by Google

abundant. Abdomen long, slender, depressed, and somewhat expanded toward apex; white dorsal bands broader, those of sixth and seventh segments greatly dilated at the sides; lateral ciliation regular, of long and abundant yellowish white hairs. Claw formula, 1.1–1.1–0.0.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 14, fig. 98): Side-pieces about three times as long as wide, attenuated at the base, a rounded quadrate outer lobe bears three rods with curved tips, a leaf-like appendage, and a seta; clasp-filament stout at base, somewhat curved, with a small terminal claw and a little seta at outer third. Harpes divided, inner lobe rounded and bearing a crown of stout spines, outer lobe blade-like, curved. Harpagones divided into a number of lamellæ. Unci forming a small basal cone.

Larva, Stage IV (plate 99, fig. 327).—Head rounded, wider than long, widest at the eyes; antennæ long, a large tuft at outer third, the part beyond slender; upper pair of head-hairs in sixes, lower in fours, ante-antennal tuft multiple. Skin glabrous; lateral abdominal hairs in twos after second segment; comb of eighth segment of many spines in a triangular patch. Air-tube about six times as long as wide, pecten short and reaching the basal third; four double-haired tufts beyond pecten, the subapical one moved well out of line; terminal hooks minute. Anal segment little longer than wide, ringed by the plate; dorsal tuft of several hairs on each side; lateral hair small, double; ventral brush confined by the chitinous ring. Anal gills long, one gill somewhat longer than the others, all roundedly pointed, about three times as long as the segment.

The larvæ live in water in holes in rocks in stream-beds, particularly the shallow pools on top of rocks. Mr. Knab first met with the species in the bed of a small river. The banks were precipitous, with overhanging vegetation which was in places very thick. A large bowlder in the dry part of the bed of the stream had a depression on top containing perhaps a gallon of water, which was swarming with mosquito larvæ of all sizes. Besides the present species the water contained *Aëdes epactius* and *Aëdes fluviatilis*, both also rock-hole inhabiting forms. Mr. Knab found the larvæ in six other pools in the same stream; a pool of clear water, shaded by an overhanging bank and by large bowlders, contained a few larvæ associated with *Culex derivator* and *Anopheles strigimacula;* a pool apparently of spring water contained larvæ, not very abundantly, associated with *Anopheles strigimacula* and a *Culex*, perhaps *Culex derivator;* a large bowlder, where the rapids passed into a canyon, contained a depression with water very foul from excrement of a predaceous mammal and covered with a thick scum; in this water were about a hundred pupæ and one larva, all of them this species; another bowlder with a shallow depression on top contained about 2 quarts of water, the larvæ here being associated with *Lutzia bigotii;* again, when there had been no rain for some time, a shallow pool between rocks, maintained by a percolation of water from the river, contained this species associated with *Culex coronator* and *Anopheles argyritarsis;* a water-hole in the stream-bed containing clear water, with this species, *Culex derivator* and *Anopheles argyritarsis*. The larvæ were also met with in small numbers in other less normal situations; once in a small ditch of muddy water in a railroad cut near town, where *Culex coronator* and *Aëdes cuneatus* were associated, and once in another railroad cut where a hole had been filled by recent rains, where *Culex coronator* and *Lutzia bigotii* were associated.

Mexico.

Córdoba, Vera Cruz, larvæ in rock-pools along the Rio San Antonio, January 4, 20, 22, 31, March 4, April 5, 1908 (F. Knab); Córdoba, larvæ in pool in railroad cut, January 26, 1908 (F. Knab); Peñuela, Vera Cruz, larvæ in water-hole beside railroad track, April 22, 1908 (F. Knab).

Digitized by Google

CULEX MORTIFICATOR Dyar & Knab.

Culex mortificator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 210, 1906.

ORIGINAL DESCRIPTION OF CULEX MORTIFICATOR:

Antennæ normal, dark throughout; head hairs in threes. Air tube seven times as long as wide, uniformly slightly tapering, the pecten on the basal fourth; tufts very long but few-haired. Comb of the eighth segment of many long spine-like scales in a large patch. Anal segment rather long, normal; anal gills unusually long.

Collected by the junior author in Zent, Costa Rica, in a hollow in a stump of a banana tree, but no adults were obtained.

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender... 5
5. Air tube four times as long as wide or over..... 7
7. Anal appendages four, normal..... 8
8. Air tube with three paired tufts posteriorly outwardly, the middle one moved laterad out of line, usually situated near or not much beyond the middle of the tube..... 9
9. Body glabrous; air tube 7 × 1; antennæ dark..... *mortificator*

DESCRIPTION OF LARVA OF CULEX MORTIFICATOR (ADULT UNKNOWN):

Larva, Stage IV (plate 97, fig. 316).—Head rounded, widest through eyes, bulging on sides, a large notch at insertion of antennæ; front margin arcuate. Antennæ long, a little curved, spined; a large tuft beyond outer third; three long spines, a short one and a digit on a pedicel at tip. Both dorsal head-tufts in threes, long, the ante-antennal tufts multiple. Mental plate triangular with straight sides; a large central tooth and ten on each side, the eighth long and projecting, the last two small. Mandible quadrangular; two long filaments and a tuft of long hairs before tip; an outer row of cilia from a collar; a row of curved processes on the front margin, each bearing a long hair and some short ones; dentition of four teeth on a process, the first long, the third small; a double tooth at base, a long serrate filament and a row of six feathered hairs within; process below thick, curved, obscurely furcate, a longitudinal and a transverse row of hairs, followed by a tuft at tip of outer limb; basal angle slight, a row of stout hairs within; a row of hairs at base. Maxilla elongate, conical, divided by a suture; inner half with a row of stout hairs along margin, some of the basal ones feathered; two rows of cilia within; a row of long hairs at tip running down along the suture; outer half with two large filaments at the middle, a spine on the other side, and some very slight dentations on the margin. Palpus small, rather slender, with four slender irregular apical digits. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter; skin smooth; lateral abdominal hairs in pairs after the second segment. Air-tube very long, nearly straight, slightly and gradually tapered, seven times as long as wide; pecten reaching one-fifth of tube; single tooth broad and short, with six branches; a long double tuft just beyond the pecten, another on the side at middle of tube and a small subapical tuft. Lateral comb of eighth segment of many spines in a large triangular patch; single spine elongate, widened at tip, fringed with spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft a group of long hairs on each side; a single lateral hair; ventral brush well developed, confined to the barred area, ventrally situated. Anal gills very long, three times as long as the segment, uniformly tapered.

The larvæ live in water in hollow trees. Mr. Knab obtained them in the hollow in a stump of a banana-tree containing a dark-brown liquid.

Costa Rica.

Zent, 20 miles from Port Limon, September 26, 1905 (F. Knab).

These larvæ were met with by our collectors only once, and died in transit from the collecting-ground, so that no adults have been reared.

Digitized by Google

CULEX CARMODYÆ Dyar & Knab.

Culex carmodyæ Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 210, 1906.

ORIGINAL DESCRIPTION OF CULEX CARMODYÆ:

Antennæ normal, pale at base. Body pilose; lateral hairs in twos after the second segment; subdorsal hairs long and in twos on segments 5, 6 and 7; tracheæ broad. Air tube five to seven times as long as wide with the three tufts in twos, the basal very long, the others successively shorter. Comb of the eighth segment normal, moderate.

Collected by Mr. Busck in San Domingo from a vase in the hotel parlor and in a slowly running water course across a road. The adults were named "*Culex salinarius* Coq." and "*Culex pipiens* L.," neither of which species occurs in the island to our knowledge. We name the species for Miss Mary Carmody, who has done excellent and faithful work in drawing the mouth parts of larvæ, and is withal a most amiable young lady.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with three paired tufts posteriorly outwardly, the middle one moved laterad out of line, usually situated near or not much beyond the middle of the tube	9
9.	Body spicular or pilose	10
10.	Dislocated tuft of tube well beyond the middle	*carmodyæ*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX CARMODYÆ:

Female.—Proboscis moderate, subcylindrical, slightly expanding to tip, labellæ conically tapered; vestiture black with bronzy luster, a pale shade beneath at middle; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, slender, one-fifth as long as proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter, rugose, pilose, black, second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed with narrow, curved, lustrous pale-brown scales on vertex, the sides with flat ones, cheeks and narrow margin of eyes white, many erect, forked black scales on nape; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, pale brown with black setæ. Mesonotum brown, with two dorsal impressed paler brown lines showing on anterior half; vestiture of short, hair-like, lustrous brown scales not obscuring the ground-color; bristles black, numerous, rather short. Scutellum trilobate, luteous, with a few bronzy hair-like scales, each lobe with a tuft of blackish bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ luteous with rows of small brown bristles.

Abdomen subcylindrical, truncated at tip; dorsal vestiture dull black with a slight greenish-metallic reflection, a row of lateral basal segmental triangular dull-white spots showing posteriorly from a dorsal view; venter whitish, with transverse, slightly triangular black bars near tips of segments; a row of yellowish hairs at tip of each segment dorsally.

Wings moderate, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell a little shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales blackish brown, black on costa, with blue and bronzy luster, the outstanding ones broadly linear, very dense on forks of second vein. Halteres whitish.

Legs slender, moderate, femora whitish beneath almost to tip; tibiæ and tarsi brownish black, with a slight pale-bronzy reflection beneath, hind tarsi with

Digitized by Google

very narrow, pale-brown bands at base and apex of each joint; fore and mid tarsi unbanded; tibiæ yellowish at tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3.5 mm.

Male.—Palpi exceeding proboscis by nearly the length of the last two joints, end of long joint and last two joints with long, dense black hairs, penultimate joint thickened, the last tapered to tip; vestiture brown with strong bronzy luster, without pale rings. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertion of hair-whorls; hairs long, dense, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells a little longer; vestiture sparse. Abdomen with distinct dull-white bands at bases of segments dorsally, the sides densely hairy. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 16, fig. 120): Side-pieces over twice as long as wide, conically tapered at tip; marginal appendages on a subapical truncated prominence consisting of three rods with hooked tips and a leaf-like appendage and a seta. Clasp-filament stout, rather long, curved, with a small articulated appendage. Harpes furcate, lower branch curved, with a rounded tip, outer bearing a dense terminal tuft of spines. Harpagones furcate, divided into numerous teeth. Basal appendages rounded, setose.

Larva, Stage IV (plate 96, fig. 313).—Head rounded, widest through eyes, bulging on sides, a large notch at insertion of antennæ, front margin arcuate; both pairs of dorsal head-hairs in threes, the ante-antennal tufts multiple. Antennæ large, basal two-thirds thick, spined; a large tuft at outer third from a notch; two long spines subapically, a long spine, a short one, and a digit at tip. Mental plate triangular, straight on sides; a large central tooth and eleven on each side, basal ones a little more remotely spaced, last one small. Mandible quadrangular; three filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of transverse rounded prominences on outer margin, each bearing a hair and a tuft of short ones; dentition of four teeth on a process, the first longest; a spine before, a tooth at base, a long serrate filament, and row of feathered hairs within; process below long, obscurely furcate, with a longitudinal and a transverse row of hairs and a tuft at end of each limb; basal angle moderate, with row of stout hairs within; a row of hairs at base. Maxilla narrowly elongate, tips conically rounded, divided by a suture; inner half with two rows of stout spines on margin and a row of cilia within; a row of long hairs at tip running down along the suture; outer half with two filaments below the middle next the suture and a spine on the other side. Palpus small, tapered, with four rather long apical digits. Body pilose; thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs multiple on first segment, triple on second, double on third to sixth; subdorsal hairs long, in twos on fifth to seventh segments; tracheæ broad. Air-tube long, tapering outwardly, over seven times as long as wide; pecten running over nearly basal third; single tooth broad, with five to seven side-branches; three long two-haired tufts on posterior margin, the middle one moved laterally out of line. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at tip, fringed with spinules. Anal segment longer than broad, ringed by the plate; dorsal tuft a group of long hairs on each side; ventral brush well developed, confined to the barred area. Anal gills moderate, longer than the segment, tapered to the rounded tip.

The larvæ occur in dirty water and artificial receptacles, being apparently semi-domesticated. Mr. Busck found them in a dirty, slowly-running water-course across a road and in water of a flower-vase in a hotel parlor.

Digitized by Google

Island of Santo Domingo, West Indies.

Santo Domingo City, August 6, 1905, larvæ in a flower-vase in hotel parlor (A. Busck); Samara, September 26, 1905, larvæ in a dirty water-course (A. Busck).

CULEX CARAIBEUS, new species.

Culex factor Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 212, 1906.

DESCRIPTION OF FEMALE AND LARVA OF CULEX CARAIBEUS (MALE UNKNOWN):

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture black, labellæ paler, a paler shade in middle of shaft, particularly beneath, but not forming a distinct ring; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, slender, one-fifth as long as proboscis, black, with a few outstanding setæ. Antennæ with basal joints somewhat shorter than apical ones, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput clothed dorsally with narrow, curved sordid-whitish scales and many erect, forked black ones; a patch of broader white scales on the sides below, the eyes narrowly white-margined; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with whitish scales and black setæ. Mesonotum brown, with two dorsal impressed darker lines, showing faintly on anterior half; vestiture of hair-like, lustrous brown scales, not obscuring the ground-color, bristles brown, numerous. Scutellum trilobate, luteous, with pale-yellowish, narrow, curved scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, brownish luteous, nude. Pleuræ and coxæ pale greenish, with small patches of white scales and rows of small brown bristles.

Abdomen subcylindrical, truncated at tip; dorsal vestiture black, without metallic reflection, segments, except the first, with transverse basal narrow white bands, joined at sides to large triangular basal white patches, visible from above on sixth and seventh segments; a row of pale hairs at tips of segments; venter entirely creamy-white scaled.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein distant slightly more than its own length from anterior cross-vein; scales blackish, the outstanding ones broadly linear, denser towards tip of wing. Halteres whitish.

Legs moderate, femora white beneath almost to tip; knees dark; tibiæ and tarsi brownish black, tips of tibiæ paler, all the legs with paler bronzy luster beneath; hind tarsi with very small, indistinct brown rings on both ends of joints, tips of last joints black. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Larva, Stage IV (plate 101, fig. 333).—Head somewhat wider than long, bulging in the region of the eyes; antennæ long, rather stout, spinulate, a large tuft at outer third, the part beyond it slender, smooth; dorsal head-hairs in threes, ante-antennal tufts multiple. Body with thorax finely spiculate; lateral abdominal hairs in twos after second segment; lateral comb of eighth segment of many spines in a triangular patch. Air-tube about seven times as long as wide, tapering slightly to tip, pecten short and reaching less than to basal third; four tufts beyond it, two-haired and rather short, the subapical one moved out of line, and situated towards tip of tube; terminal hooks minute. Anal segment longer than wide, ringed by the plate, which is spiculate on its posterior border; dorsal tuft of three hairs of different lengths on each side; ventral brush

Digitized by Google

confined by the barred area. Anal gills small, shorter than the segment, bluntly pointed, equal.

Type: No. 12207, U. S. Nat. Mus.

Mr. Busck got the larvæ in an open pool in coral rock in the country.

Barbados, West Indies.

Barbados, July 15, 1905 (A. Busck).

CULEX ANNULIPES (Theobald).

Melanoconion annulipes Theobald, Mon. Culic., iv, 512, 1907.
Melanoconion annulipes Theobald, Mon. Culic., v, 458, 1910.

ORIGINAL DESCRIPTION OF MELANOCONION ANNULIPES:

Head deep brown with grey scales; thorax deep rich brown, paler in the middle; abdomen deep brown with basal white lateral spots. Legs deep brown with the tarsals with apical and basal pale banding, the last hind tarsal pale ventrally.

♀. Head deep brown with long thin narrow-curved grey scales and some dusky ones, the palest around the border of the eyes, numerous dark upright forked scales with deep violet reflections and dull pale grey scales at the sides of the head; clypeus deep brown; proboscis deep brown unbanded; palpi deep brown with long black chætæ, the apical segment long; antennæ deep brown, basal segment large, rather paler, with almost testaceous hue on one side.

Thorax black, clothed with scattered narrow-curved bronzy scales and black chætæ, with a few almost golden ones on each side of the scutellum; scutellum paler, with narrow-curved bronzy and some dull golden ones, the mid lobe with six black chætæ; scutellum deep brown; pleuræ deep brown with grey sheen (scales?).

Abdomen deep brown, unbanded, with basal lateral white spots and pale golden border-bristles.

Legs deep brown, the hind legs with dull pale apical and basal bands, the last segment pale beneath, showing in a marked manner, the pale banding not so distinct in the fore and mid legs; ungues small, equal and simple; a whitish knee spot present.

Wings with dense large scales especially on the apical areas of the veins, some thin lateral ones on the stems of the second, fourth, and on the branches of the fifth; first sub-marginal cell much longer but little narrower than the second posterior cell, its base nearer the base of the wing, its stem about one-fifth the length of the cell; stem of the second posterior cell slightly more than half the length of the cell; posterior cross-vein longer than the mid, about one and a half times its own length distant from it.

Length.—3 mm.

Habitat.—Red Hills, Jamaica, W. I. (Dr. Grabham).

Observations.—A very distinct species with banded legs. The last hind tarsal appears almost white in the specimen, but I think the pale scales are only on the ventral aspect. Described from one perfect ♀.

This species is unknown to us and there are no specimens of it in the collection of the National Museum.

CULEX JANITOR Theobald.

Culex janitor Theobald, Mon. Culic., iii, 183, 1903.
Culex janitor Grabham, Can. Ent., xxxvii, 406, 1905.
Culex janitor Theobald and Grabham, Mosq. or Culic. of Jamaica, 24, 1905.
Culex janitor Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 209, 1906.
Culex janitor Theobald, Mon. Culic., iv, 453, 1907.
Culex janitor Theobald, Mon. Culic., v, 355, 1910.

ORIGINAL DESCRIPTION OF CULEX JANITOR:

Thorax deep brown, with rich brown narrow-curved scales, and with a slightly paler curved line on each side about the middle of the mesonotum (in some lights may be seen a median dark line, in others two median parallel lines); abdomen in the ♀ apparently unbanded, with small basal white lateral spots, venter with broad basal white bands. Fore and mid legs unbanded, hind with narrow bands, mostly basal, but to some extent involving both sides of the joints. Fork-cells rather short, their bases about level. In the ♂ there are basal white abdominal bands.

♀. Head deep brown, with narrow-curved creamy scales in the middle, darker at the sides and very pale yellow round the eyes, with numerous black upright forked

Digitized by Google

scales; palpi rather long, black scaled, antennæ and proboscis black, the latter pale at the apex; basal joint of antennæ testaceous.

Thorax deep brown, with narrow-curved brown scales and black bristles, with a short paler scaled line running on to the mesonotum about its middle on each side; scutellum paler, with smaller narrow-curved pale scales and dark brown border-bristles; metanotum deep blackish brown.

Abdomen deep brown, with dull violet reflections, practically unbanded, but now and then showing a few grey basal scales to the segments, with small basal lateral white spots; venter with basal white bands.

Legs brown, fore and mid unbanded, coxæ pale, also venter of femora; hind legs with pale knee spot and with narrow pale bands involving both sides of the joints; ungues equal and simple.

Wings with the first sub-marginal cell very little longer, but narrower than the second posterior, their bases nearly level, that of the second posterior, if anything, nearer the base of the wing; stem of the first sub-marginal more than half the length of the cell; stem of the second posterior rather more than half the length of the cell; the mid cross-vein not quite joining the supernumerary, posterior cross-vein longer than the mid, nearly twice its own length distant from it. Halteres pale, with slightly darker knob.

Length.—5 mm.

♂. Palpi brown, with one narrow pale band towards the base, the two apical joints equal, both slightly paler at the base, with a few short brown hairs on each side, also at the apex of antepenultimate joint; proboscis and antennal plumes brown, basal joint of antennæ large, pale reddish-brown.

Thorax as in ♀, but rather brighter.

Abdomen with narrow pale bands on three of the basal segments, then two with large basal pale spots, not forming bands, and then a mass of dull grey scales on the apical segment; densely hairy. The banding in the hind legs is more distinct than in the ♀, especially at the tibio-metatarsal joint, and there are also traces of banding, mostly basal in the mid legs; fore and mid ungues unequal, uniserrated; hind equal and simple. Fork-cells small, stem of the first sub-marginal about two-thirds the length of the cell; stem of the second posterior cell nearly as long as the cell; posterior cross-vein about two and a half times its own length from mid cross-vein. Halteres pallid with slightly fuscous knob.

Length.—5 mm.

Habitat.—Kingston, Jamaica (Dr. Grabham).

Observations.—Described from a series taken by Dr. Grabham. It bears a strong superficial resemblance to *Culex secutor*, but differs in having an unbanded abdomen in the ♀, in the structure of the ♂ palpi, the two apical joints being much shorter and rather stouter than in *C. secutor*.

The species are found congregated with *Deinocerites cancer* at the entrance to crab-holes by the sea-shore; they are by no means as numerous as *D. cancer* and never fly up and attack one, so are probably nocturnal like *D. cancer*, "I have never seen *C. secutor*," says Dr. Grabham, "in that locality, *C. secutor* being an inland species."

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX JANITOR:

Female.—Proboscis rather long, subcylindrical, uniform, the labellæ conically tapered; vestiture black, labellæ paler; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, slender, one-fourth as long as proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter, rugose, pilose, black, the second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed dorsally with narrow, curved sordid-whitish scales in the middle, darker on each side, and many erect, forked black ones; the scales on lower part of sides broader and white, the eyes narrowly white margined; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with whitish scales and brown setæ. Mesonotum brown, with two dorsal, impressed, paler brown lines showing faintly on anterior half; vestiture of narrow, curved lustrous-brown scales not obscuring the ground-color; bristles brown, numerous; a pair of obscure oblique, pale, subdorsal lines. Scutellum trilobate, luteous, with pale-

Digitized by Google

yellowish, narrow, curved scales, each lobe with a tuft of blackish bristles. Postnotoum elliptical, prominent, brownish luteous, nude. Pleuræ and coxæ luteous, with small patches of white scales and with rows of small brown bristles.

Abdomen subcylindrical, truncated at tip; dorsal vestiture black, with a slight greenish-metallic reflection, a row of lateral basal segmental triangular small sordid-whitish spots; venter yellowish, with indistinct dusky-black apical segmental bands, a row of pale hairs at tip of each segment dorsally.

Wings moderate, hyaline; petiole of second marginal cell about one-half as long as its cell, that of second posterior cell a little shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales blackish brown, darker costally, with bluish and bronzy reflection, the outstanding ones broadly linear, very dense on forks of second vein. Halteres whitish.

Legs moderate; femora white beneath almost to tips; hind knees narrowly white; tibiæ and tarsi brownish black, tips of tibiæ white; hind tarsi with very narrow white bands at base and apex of each joint, tip of last joint black; mid tarsi with the two basal joints narrowly white marked at base, front tarsi unmarked. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

Male.—Proboscis slightly enlarged towards tip, black scaled, with a narrow white ring beyond the middle. Palpi exceeding proboscis by nearly the length of last two joints, end of long joint and last two joints with numerous black hairs, faint whitish rings at bases of last two joints and at basal third of long joint. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertion of hair-whorls; hairs, long, dense, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells a little longer; vestiture sparse. Abdomen long, depressed, expanded toward apex, with distinct but rather narrow white bands at bases of segments dorsally; lateral ciliation dense, rather long and coarse, brown. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 16, fig. 119): Side-pieces over twice as long as wide, conically tapered at tip; marginal appendages on a subapical truncated prominence consisting of three rods with hooked tips and a leaf-like appendage and a seta. Clasp-filament stout, rather long, curved, with a small articulated appendage. Harpes furcate, lower branch curved, with a rounded tip, outer bearing a dense terminal tuft of spines. Harpagones furcate, inner branch simple, outer divided into several irregular teeth.

Larva, Stage IV (plate 102, fig. 337).—Head rounded, a little wider than long; antennæ rather small, uniform, the tuft at middle, arising from a slight notch; upper head-hairs in fives, lower in sixes, ante-antennal tuft multiple. Lateral hairs of abdomen in sevens on first segment, fours on second, threes on third to fifth, twos on sixth; subdorsal hairs long and double on fourth to sixth segments. Lateral comb of eighth segment of many spines in a triangular patch. Air-tube about five times as long as wide, subconically tapered outwardly, pecten of short, sparse teeth, reaching the basal two-fifths; five multiple tufts of long hairs, two of them within the pecten, the subapical one moved laterad out of line, the two towards tip of tube shorter and sparser. Anal segment about as long as broad, ringed by the plate; dorsal tuft of four hairs of different lengths on each side; lateral hair small, single; ventral brush confined by the chitinous ring. Anal gills very large and broad, tracheate, the ends bluntly rounded, about three times as long as anal segment and over half its diameter.

The larvæ occur in crab-holes along the shore, associated with *Deinocerites cancer*. The adults frequent the upper parts of the holes, coming out to swarm

Digitized by Google

in the evening, and probably do not bite. Dr. Grabham says: "Collected with *Deinocerites cancer*, Theob., from crab holes along the sea shore. The water in the holes is brackish. Larvæ abundant after seasonal rains in May and October." He says that the eggs are laid in rafts.

Jamaica.

Kingston, in crab-holes along the shore (M. Grabham).

Dr. Grabham's figures and descriptions give the proportions of the air-tube of the larva wrongly. We have been able to correct this matter from specimens which Dr. Grabham has kindly sent us. The species is not allied to others that inhabit crab-holes on other islands and on the mainland, and it would seem that this species had independently acquired the habit on the island of Jamaica.

CULEX EREMITA, new species.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX EREMITA:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture black, with bronzy luster, with a diffuse white mark beneath near the middle; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, slender, one-sixth as long as proboscis, black-scaled, with many small hairs and a few outstanding setæ. Antennæ with the joints subequal, rugose, pilose, black, second joint pale at base; tori subspherical, with a cup-shaped apical excavation, black; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput dark brown, clothed with narrow, curved brown scales, a median line of similar yellowish-white scales; margin of eyes and a patch on lower part of the side white scaled, with a silky luster, the area on each side of the median line with numerous erect, black forked scales; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with black setæ. Mesonotum dark brown, with two dorsal impressed concolorous lines showing faintly on anterior half; vestiture of minute, hair-like golden-brown scales and numerous coarse brown bristles arranged in rows. Scutellum trilobate, clothed with narrow, curved pale-yellowish scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, blackish brown, nude. Pleuræ and coxæ luteous brown, with small patches of white scales and rows of small brown bristles.

Abdomen subcylindrical, depressed, truncated at tip; dorsal vestiture of dull-black scales, with narrow basal white bands on all but the first segment; bands transverse, uniform, expanded laterally into broad triangular spots, which show dorsally on sixth and seventh segments; venter yellowish white, the last two segments with black apical bands; a row of yellowish hairs at tip of each segment dorsally.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell about equal to its cell; basal cross-vein slightly more than its own length distant from anterior cross-vein; scales of veins blackish brown, the outstanding ones broadly linear, denser and slightly broadened apically on forks of second and fourth veins and outer half of third vein. Halteres whitish, with dark knobs.

Legs moderate, the femora whitish below almost to tip; tibiæ and tarsi black, with a bronzy luster; tips of hind femora and of all the tibiæ silky white; tarsi very narrowly ringed with white at bases of all the joints and apically also on hind tarsi, except on last joint. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.5 mm.

Male.—Proboscis straight, slender, slightly enlarged apically. Palpi long, exceeding the proboscis by more than the length of last joint; tip of long joint and

Digitized by Google

the last two joints somewhat thickened and clothed with long black hairs; vestiture entirely of black scales above, beneath with shining silvery scales, except at tips of the joints. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls; hairs of whorls long, dense, black. Coloration similar to the female. Abdomen elongate, subcylindrical, somewhat broadened apically, basal pale bands somewhat broader than in the female; without distinct lateral ciliation, but with numerous coarse hairs on apical portion. Wings narrower than in the female, the stems of the fork-cells longer, vestiture less abundant; basal cross-vein less than twice its length from anterior cross-vein. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Genitalia (plate 13, fig. 95): Side-pieces three times as long as wide, tips conically tapered, marginal appendages on a long, narrow, truncated, subapical prominence, consisting of two rods, the outer one much longer and thicker. Clasp-filament strongly inflated in the middle, on the outer side with a long, slender, terminal appendage. Harpes furcate, inner lobe broad, produced, bearing a crown of spines. Harpagones divided into several plates. Basal appendages remote, rounded, bearing several short setæ.

Larva, Stage IV (plate 100, fig. 331).—Head rounded, slightly wider than long; antennæ long, stout, spinulate, a large tuft at apical third, the part beyond it slender, smooth; upper pair of dorsal head-hairs in fours, lower pair in threes, the ante-antennal tuft multiple. Body with the thorax finely spiculate; lateral abdominal hairs in twos after the first segment. Comb of eighth segment of many spines in a triangular patch. Air-tube seven times as long as wide, pecten short, not reaching the basal third, followed by four tufts, either two or three haired, the subapical one removed out of line and situated beyond outer third of tube; terminal hooks minute. Anal segment about as long as wide, ringed by the plate; dorsal tuft of four hairs of different lengths on each side; lateral hair small, single; ventral brush confined by the chitinous ring. Anal gills small, shorter than the segment, equal.

Type: No. 12198, U. S. Nat. Mus.

The larvæ live in crab-holes containing fresh water. Mr. Busck found them in a deep crab-hole near a river, and in a hole in marshy land along a river, possibly originally a crab-hole.

Island of Santo Domingo, West Indies.

Santo Domingo, August 7 and 8, 1905 (A. Busck).

CULEX HABILITATOR Dyar & Knab.

Culex habilitator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 212, 1906.

ORIGINAL DESCRIPTION OF CULEX HABILITATOR:

Antennæ with the tuft at outer third, all dark. Head hairs, the upper tuft in four or five, the lower in three. Body pilose; lateral hairs in twos after the second abdominal segment; subdorsal hairs in threes on segments 3 to 7. Air tube very long, 8 × 1, the pecten reaching nearly one-third.

The larvæ were collected by Mr. Busck in a small pool in a cave in coral cliffs near the ocean in San Domingo and in a large crab-hole in a lagoon along a river, but these last are referred here with doubt as the condition of the skins is imperfect. The specimens were named "*Culex secutor* Theob."

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender.. 5
5. Air tube four times as long as wide or over..... 7
7. Anal appendages four, normal..... 8
8. Air tube with four paired tufts posteriorly outwardly (sometimes increased by additional ones basally), the subapical one moved laterad out of line, usually situated at the outer third of the tube..... 14

Digitized by Google

14. Air tube long, over 5 × 1, the sides nearly straight without marked tapering 15
15. Body spicular-pilose 16
16. Air tube 8 × 1, the tufts 3-haired and short; antennæ dark *habilitator*

DESCRIPTION OF MALE AND LARVA OF CULEX HABILITATOR (FEMALE UNKNOWN):

Male.—Proboscis moderate, subcylindrical, slightly thickened at apex, labellæ conically tapered; vestiture black, broadly pale beyond the middle. Palpi exceeding the proboscis by the length of the last joint; apex of long joint and last two joints slightly thickened and bearing numerous rather dense black hairs; vestiture brownish black. Antennæ plumose, with the last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls; hairs long, dense, and black; tori subspherical, with a cup-shaped apical excavation, brown, blackish within. Eyes black. Clypeus rounded triangular, dark brown, nude. Occiput brown, clothed with narrow, curved, pale brownish-yellow scales dorsally, flat ones on the sides, margin of eyes narrowly white; many erect, forked black scales on the nape.

Prothoracic lobes elliptical, remote dorsally, brown, with many black setæ. Mesonotum brown, clothed with narrow, curved lustrous-brown scales and rows of brown bristles, the scales around the ante-scutellar space a little paler. Scutellum trilobate, with a few narrow, curved pale scales, each lobe with a tuft of black bristles. Postnotum elliptical, luteous, nude. Pleuræ and coxæ luteous, with a green tint, with small pale setæ.

Abdomen subcylindrical, expanded posteriorly; dorsal vestiture black, each segment, except the first, with a very narrow white band at base, widening into triangular spots at the sides, especially on sixth and seventh segments; venter whitish, tips of segments broadly black; lateral hairs abundant, moderately long, pale.

Wings moderate, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell nearly equal to its cell; basal cross-vein more than its own length from anterior cross-vein; vestiture brown, sparse, the outstanding scales rather broadly linear.

Legs moderate, black, femora white beneath, tibiæ with a pale line on the under side; hind tarsal joints very narrowly white ringed at base and apex, except tip of last joint; mid and front tarsi with the first two joints ringed at base and apex, the third at base only. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 14, fig. 96): Side-pieces three times as long as wide, tips conically tapered; marginal appendage on a narrow truncated subapical prominence consisting of a single rod. Clasp-filament strongly inflated in middle on outer side, with a slender terminal appendage. Harpes furcate, the inner lobe produced, bearing a crown of dense spines. Harpagones divided into several plates, a stout, long, jointed process arising from a basal arcuate bar on each side. Basal appendages rounded, bearing several short setæ.

Larva, Stage IV (plate 100, fig. 332).—Head transverse, widest through eyes, rounded on the sides, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, slightly curved, basal two-thirds thick and well spined, with a tuft from a notch; two large setæ before the tip, a long seta, a short seta, and a digit. Upper head-tufts of four or five hairs, lower of three, ante-antennal tuft multiple. Mental plate triangular, rather straight on sides; a large central tooth and ten on each side, the last two small, the ones before large and projecting. Mandible quadrangular; two filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of rounded transverse prominences on outer margin bearing hair-tufts; dentition of four teeth on a

Digitized by Google

process, the first longest; a spine before, a small tooth and a large trifid one at base, a long serrate filament and row of feathered hairs within; process below obscurely furcate, with a transverse and a longitudinal row of hairs and a tuft at tip of each limb; basal angle small, a row of hairs within enlarged dentate bases; a row of long hairs at base. Maxilla elongate, conical at tip, divided by a suture; a row of spines on margin of inner half and two rows of cilia; a row of long hairs at tip running down along the suture; outer half with two filaments below middle and a spine on other side. Palpus small, with four minute apical digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs multiple on first segment, triple on second, double on third to sixth; subdorsal hairs in threes on third to seventh segments; skin pilose. Air-tube very long and slender, gradually tapering, eight times as long as wide; pecten not reaching basal third, its teeth broad, with four or five branches; four tufts beyond pecten, the subapical one moved laterally out of line. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at tip, fringed with spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft a group of long hairs on each side; a single lateral hair; ventral brush well developed, confined to the barred area.

The larvæ live in ground-pools. Mr. Busck found them in a pot-hole near the coast, where there were many holes and caves.

Island of Santo Domingo, West Indies.

Santo Domingo, August 10, 1905 (A. Busck).

The specimens bred from the larvæ are males only.

CULEX VINDICATOR Dyar & Knab.

Culex inquisitor Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 211, 1906.
Culex vindicator Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 255, 1909.

ORIGINAL DESCRIPTION OF CULEX VINDICATOR:

The name *Culex inquisitor* D. and K. is here restricted to the Trinidad specimens. We propose the new name *Culex vindicator* for part of the specimens from Dominica included under *inquisitor* (Journ. New York Ent. Soc., xiv, 211, 1906). In the Dominican species the proboscis is not ringed, the tarsal joints are narrowly marked with white at both ends, except that the tip of the last hind tarsal joint is black, the abdomen with basal white segmental bands.

Four specimens, Dominica, July (A. Busck).

Type no. 12098, U. S. N. M.

The larvæ are similar to those of *inquisitor*, but the basal tuft of the tube is without the pecten.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX VINDICATOR:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture brown, with bronzy luster; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, slender, one-fifth as long as proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter, rugose, pilose, black, the second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on the inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed with narrow, curved lustrous-brown scales, and many erect, forked brown ones, eyes with a border of white scales expanding below; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with brown setæ. Mesonotum brown with two dorsal impressed concolorous lines showing very faintly on anterior half; vestiture of narrow, curved golden-brown scales, paler around ante-scutellar space; bristles coarse, brown, numerous. Scutellum trilobate, luteous, clothed with narrow, curved pale-yellowish scales, each lobe with a tuft

Digitized by Google

of brown bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ luteous, with small patches of white scales and with rows of small brown bristles.

Abdomen subcylindrical, depressed truncated at tip; dorsal vestiture dull black, with a slight reflection, a rather narrow white band at base of each segment, except the first, triangularly produced mesially, a row of lateral, basal, segmental, triangular spots; venter yellowish white; a row of yellowish hairs at tip of each segment dorsally, end of abdomen strongly hairy.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales blackish brown, blackish on the costa, with a metallic luster, the outstanding ones broadly linear, very dense outwardly, especially on forks of second vein. Halteres whitish.

Legs moderate, femora whitish beneath almost to tip; knees and tips of tibiæ pale; tibiæ and tarsi bronzy black, with a brassy reflection beneath, the hind tarsi with very narrow white bands at base and apex of each joint, the last joint dark at tip; bands less distinct on fore and mid tarsi. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.2 mm.

Male.—Proboscis straight, longer than in the female, thickened towards apex. Palpi slender, exceeding proboscis by nearly the length of last two joints, end of long joint and the last two joints with long, dense black hairs; vestiture bronzy black, without rings. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertion of hair-whorls; hairs long, dense, brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells a little longer; vestiture sparse. Abdomen with the dorsal white basal bands broader, expanded laterally on last three segments, mesially produced on second to fifth; sides densely hairy. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.2 mm.

Genitalia (plate 14, fig. 104): Side-pieces over twice as long as wide, conically tapered at tip; marginal appendages on a subapical truncated prominence consisting of three rods with hooked tips and a leaf-like appendage and two short, rounded rods. Clasp-filament stout, rather long, curved with a small articulated appendage. Harpes furcate, lower branch curved, with a rounded tip, outer bearing a dense terminal tuft of spines. Harpagones furcate, divided into numerous spurs. Basal appendages represented by a tuft of setæ on each side.

Larva, Stage IV (plate 98, fig. 322).—Head rounded, prominent at eyes; antennæ rather long, dark, the tuft at outer third, the part beyond slender; both pairs of head-tufts in threes, ante-antennal tufts multiple. Body with the skin pilose, the lateral hairs multiple on first abdominal segment, in twos on second to sixth; lateral comb of eighth segment of many spines in a large triangular patch. Air-tube about five times as long as wide, slightly tapering outwardly; pecten of rather large teeth, about sixteen in number, the basal ones smaller, all evenly spaced, reaching two-fifths the length of tube; a long double-haired tuft just within pecten; a small triple-haired one slightly beyond middle of tube, placed well towards dorsal aspect; outer tuft triple, at outer fourth; terminal hooks minute. Anal segment longer than wide, ringed by the plate, which is minutely spined posteriorly; dorsal tuft of three hairs of different lengths on each side; lateral hair single, small; ventral brush large, confined by the chitinous ring. Anal gills twice as long as the segment, tapering, unequal.

The larvæ live in foul water in cacao-husks. The eggs are laid in raft-shaped masses on the water-surface.

Island of Dominica, West Indies.

Digitized by Google

Dominica, July 28, 1905, larvæ and egg-boats in ill-smelling, thick water in cacao-husks on a cacao plantation (A. Busck).

CULEX DICTATOR Dyar & Knab.

Culex dictator Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 255, 1909.

ORIGINAL DESCRIPTION OF CULEX DICTATOR:

Another part of the specimens referred to above from Dominica are close to *vindicator*, but the abdomen is differently colored; in the present species it is black above with a coppery luster, the basal white bands of uniform width, while in *vindicator* it is dull black, the basal white bands mesially produced.

Six specimens, Dominica, July (A. Busck).

Type no. 12099, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX DICTATOR:

Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture brown with bronzy luster; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small and slender, one-fifth as long as proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter than the apical ones, rugose, pilose, black, second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed with narrow, curved, lustrous pale-brown scales; eyes with a border of silvery-white scales expanding below; many erect, pale-brown, forked scales on nape; a row of black bristles along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with brown setæ. Mesonotum brown, with two dorsal impressed concolorous lines, showing very faintly on anterior half; vestiture of narrow, curved golden-brown scales, paler around ante-scutellar space; bristles coarse, brown, numerous. Scutellum trilobate, luteous, clothed with narrow, curved pale-yellowish scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ luteous, the pleura with dark spots, with small patches of white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncated at tip; dorsal vestiture brown, with a strong coppery luster, a rather narrow, shining gray band at base of each segment except the first, uniform, joining a row of lateral, basal, segmental, triangular spots; venter yellowish white; a row of yellowish hairs at tip of each segment dorsally; tip of abdomen strongly hairy.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales blackish brown, blackish on the costa, with a metallic luster, the outstanding ones linear, denser outwardly, especially on third vein. Halteres whitish.

Legs moderate, femora whitish beneath almost to tip; knees and tips of tibiæ pale; tibiæ and tarsi bronzy black with a brassy reflection beneath, hind tarsi with very narrow white bands at base and apex of each joint, last joint dark at tip; bands obsolete on fore and mid tarsi. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis straight, longer than in the female, slightly thickened towards the apex. Palpi slender, exceeding the proboscis by more than the length of the last joint; end of long joint and last two joints with long, dense black hairs; vestiture bronzy black, without rings, beneath with a brassy sheen. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertions of hair-whorls; hairs long, dense, brown. Coloration similar to the female. Wings slightly narrower than

Digitized by Google

in the female, the stems of the fork-cells longer, vestiture less abundant. Abdomen with the white basal bands broader than in the female, expanded laterally on sixth and seventh segments, the sides densely hairy. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 14, fig. 99): Side-pieces over twice as long as wide, tips conically tapered; lateral prominence quadrate, bearing three spines, a leaf-like appendage, an expanded rod, and a seta. Clasp-filament moderate, uniform, simple, with a terminal claw. Harpes with inner arm erect, thick, crowned with spines, outer arm curved, pointed, rather long. Harpagones divided into several plates, one of them large and divided into three large teeth.

Larva, Stage IV (plate 98. fig. 321).—Head rounded, somewhat wider than long, bulging at the eyes; antennæ long, rather slender, a tuft well beyond the middle, the part beyond it slender, base of shaft spinulate; head-hairs in threes, ante-antennal tufts multiple. Body with the skin glabrous; lateral abdominal hairs in twos after second segment; lateral comb of eighth segment of many spines in a large triangular patch. Air-tube six times as long as wide, tapering outwardly, subfusiform; pecten of long teeth running somewhat spirally and reaching nearly middle of tube; a two-haired tuft within tip of last pecten tooth, and two more, the middle one moved laterally out of line. Anal segment longer than wide, ringed by the plate; dorsal tuft of three hairs of different lengths on each side; lateral hairs single, small; ventral brush confined by the chitinous ring. Anal gills about as long as the segment, bluntly pointed, equal.

The larvæ live probably in holes in rocks. Mr. Busck found them at the bottom of an abandoned prospect-hole, 30 feet deep, in a mountain side. The hole contained clear sulphurous water.

Island of Dominica, West Indies.

Dominica, July 28, 1905, larvæ in a prospect-hole (A. Busck).

CULEX MOLLIS Dyar & Knab.

Culex carmodyæ mollis Dyar & Knab, Proc. Biol. Soc. Wash., xix, 171, 1906.
Culex carmodyæ mollis Theobald, Mon. Culic., v, 613, 1910.

ORIGINAL DESCRIPTION OF CULEX CARMODYÆ MOLLIS:

Mr. Urich has sent us a series of isolations bred from larvæ in a hollow tree at Sangre Grande, Trinidad. The larvæ are so near to those of *Culex carmodyæ* Dyar & Knab, described from Santo Domingo (Journ. N. Y. Ent. Soc., xiv, 210, 1906), that we are unable to distinguish them. The adults, however, differ in having very narrow white bands at the bases of the tarsal joints with a few white scales at the apices of the joints also. In both the Santo Domingan *carmodyæ* and the Trinidad representative, *mollis*, the hind tibiæ have a line of bluish white scales above, the legs being black, the ends of the hind tibiæ light brown. In *carmodyæ* there is no trace of white tarsal bands, the legs being black, with a scarcely lighter brownish tint at the joint; in *mollis* the bands are very distinct although extremely narrow, hardly wider than the length of a scale.

Six specimens, four males, two females.

***Type.*—Cat. No. 10,022, U. S. Nat. Mus.**

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX MOLLIS:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture bronzy brown; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi small and slender, one-fifth as long as proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter, rugose, pilose, black, the second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed with narrow, curved, lustrous pale-brown scales and many erect, forked

Digitized by Google

brown ones on vertex; broad, flat white ones on sides; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with black setæ. Mesonotum brown, with two dorsal impressed paler brown lines showing faintly on anterior half; vestiture of narrow, curved lustrous-brown scales, giving a bronzy luster to the thorax, bristles black, numerous. Scutellum trilobate, luteous, with narrow, curved, lustrous pale-brown scales, each lobe with a tuft of blackish bristles. Postnotum elliptical, prominent, dull luteous, nude. Pleuræ and coxæ greenish luteous, shaded with black beneath the wings and in the center, with flat white scales and rows of small brown bristles.

Abdomen subcylindrical, depressed, truncated at tip; dorsal vestiture brownish black, with a slight greenish-metallic reflection, a rather broad yellowish-white band at base of each segment, except the first, joining a row of lateral basal, triangular, white spots, showing posteriorly from a dorsal view; venter yellowish white-scaled.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein a little less its own length distant from anterior cross-vein; scales blackish brown, blackish on costa, the outstanding ones broadly linear, very dense on forks of second vein. Halteres whitish.

Legs slender, moderate, bronzy brown, femora white beneath almost to the tip; tibiæ with brassy reflection beneath; tarsi brownish black, with a slight blue reflection, the hind with very narrow pale bands at base and apex of each joint, obsolete on fore and mid tarsi; knees pale. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 3 mm.

Male.—Proboscis straight, slightly longer than in the female. Palpi slender, exceeding the proboscis by nearly the length of the last two joints, end of long joint and last two joints with long black hairs; vestiture uniformly bronzy brown. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertion of hair-whorls; hairs long, dense, black. Coloration similar to the female. Wings slightly narrower than in the female, the stems of the fork-cells hardly longer; vestiture sparse. Abdomen long, slender, expanded towards apex, with distinct white bands at bases of segments dorsally; lateral ciliation of long, fine, dense, pale yellowish hairs. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 15, fig. 109): Side-pieces over twice as long as wide, conically tapered at tip; marginal appendages on a subapical truncated prominence consisting of three rods with hooked tips and a leaf-like appendage and two shorter rods. Clasp-filament stout, rather long, curved, with a small articulated appendage. Harpes furcate, the lower branch curved, with a rounded tip, the inner pointed and finely setose. Harpagones furcate, inner branch small, rounded, outer divided into many slender, elongated teeth. Basal appendages rounded, setose, very remote.

Larva, Stage IV (plate 96, fig. 315).—Head rounded, widest through the eyes; antennæ long, stout, spinose, a large tuft at outer third, the part beyond slender; head-hairs in threes, ante-antennal tuft multiple. Body with the skin glabrous; lateral abdominal hairs in twos after second segment; lateral comb of eighth segment of many spines in a large patch. Air-tube six times as long as wide, tapering on outer half, slightly fusiform; pecten short, not reaching basal third, followed by three tufts, the middle one moved laterally out of line, all two-haired; terminal hooks minute. Anal segment longer than wide, ringed by the plate, becoming spinous on posterior margin; dorsal tuft of three

Digitized by Google

hairs of different lengths on each side; ventral brush confined by the chitinous ring. Anal gills longer than the segment, rather bluntly tipped, equal.

The larvæ live in the water in hollow trees.

Island of Trinidad, British West Indies.

Sangre Grande, bred from larvæ in hollow trees, September, 1906 (F. W. Urich).

CULEX DECLARATOR Dyar & Knab.

Culex declarator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 211, 1906.

ORIGINAL DESCRIPTION OF CULEX DECLARATOR:

Antennal tuft placed well outward, the member all dark. Head hairs in fours; body pilose; lateral hairs in twos after the second abdominal segment. Air tube five times as long as wide, the pecten reaching one-third. Lateral comb of the eighth segment large; anal gills short and blunt.

Collected by Mr. Busck in a lagoon pool far from habitation on the south coast of Trinidad. The adults were named "*Culex pipiens* L." by Mr. Coquillett.

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender.. 5
5. Air tube four times as long as wide or over..... 7
7. Anal appendages four, normal..... 8
8. Air tube with three paired tufts posteriorly outwardly, the middle one moved laterad out of line, usually situated near or not much beyond the middle of the tube..... 9
9. Body spicular or pilose..... 10
10. Dislocated tuft of tube not, or scarcely beyond the middle..... 11
11. Anal processes broad and bluntly rounded..... 12
12. Air tube gently tapered uniformly; body pilose..... *declarator*

DESCRIPTION OF MALE AND LARVA OF CULEX DECLARATOR (FEMALE UNKNOWN):

Male.—Palpi long, slender, broken in the unique specimen. Proboscis broken. Antennæ rather short, plumose, the two long terminal segments clothed with rather long cilia, the others shortened, with black rings at the insertions of the hair-whorls; hairs of whorls long, moderately abundant, blackish. Occiput clothed with narrow, curved brown scales, scattered, dark-brown, erect, forked scales on vertex, whitish recumbent ones on sides, ocular margin white scaled.

Mesonotum deep brown, with coppery-brown, narrow, curved scales and two very narrow, naked dorsal striæ; scales around ante-scutellar space paler; rows of long, coarse, black, sparse setæ and groups of similar setæ along the sides, particularly over roots of wings. Scutellum clothed with pale, shining, narrow, curved scales and with a group of long setæ on each lobe. Postnotum brownish with a prominent, well-defined median carina, nude. Pleuræ blue green, with a few scattered white scales; coxæ luteous.

Abdomen subcylindrical, depressed, above blackish brown, the segments except the first with white basal bands occupying about one-fourth of the segments; on the seventh segment the band is very narrow in the middle but greatly broadened at the sides and extends down about two-thirds of the lateral margins; eighth segment short, more than half white scaled; ventral surface clothed with dirty-white scales; lateral ciliation of long brown hairs.

Wings rather broad, with narrow brown scales along the veins, those toward the apices slightly broadened and denser; petiole of second marginal cell more than half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein more than its own length behind anterior cross-vein. Halteres pale, large, apices of knobs white scaled.

Legs brown, with a strong bronzy luster, particularly on under surface; femora pale beneath nearly to apex, tibiæ darker towards apex, extreme tips pale; hind legs, with apices of first, second, and third tarsal segments pale and bases of all the tarsal segments narrowly pale ringed; white marks obsolete on fore and mid legs. Claw formula, 1.1–1.1–0.0.

Digitized by Google

Length: Body about 3.3 mm.; wing 2.8 mm.

Genitalia (plate 15, fig. 110): Side-pieces over twice as long as wide, the tips conically tapered; marginal appendages on a truncated subapical prominence, consisting of four rods with hooked tips, a leaf-like appendage, and a seta. Clasp-filament stout, curved, with a small articulated terminal appendage. Harpes furcate, outer half simple, curved, inner with a crown of long spines. Harpagones divided.

Larva, Stage IV (plate 97, fig. 317).—Head rounded, widest through the eyes, bulging on the sides, a large notch at insertion of antennæ, the front margin arcuate; upper pair of head-hairs in fours, ante-antennal tuft multiple. Antennæ large, thick on basal two-thirds, spined; a large tuft from a notch at outer third; two long subapical setæ; a long seta, a short seta, and a digit on a pedicel at tip. Mental plate triangular, straight on sides, a large central tooth and eight on each side, the last one very small, the two before slightly projecting. Mandible quadrangular; two filaments and a tuft of hair before tip; an outer row of cilia from a collar; a row of rounded prominences on outer margin bearing short hair-tufts; dentition of four teeth on a process, the first longest, a spine before, a small tooth and a large trifid one at base, a long, smooth filament and row of feathered hairs within; process below slightly curved, obscurely furcate, with a transverse and a longitudinal row of hairs and a tuft at tip of each limb; basal angle small, with a row of hairs within, two of which have enlarged feathered bases; a row of hairs at base. Maxilla elongated, conically pointed at tip, divided by a suture; inner half with a row of stout hairs on the margin, some of the basal ones feathered, two rows of cilia within; a row of long hairs at the tip running down along the suture; outer half with 2 filaments below the middle and a row of small spines on margin. Palpus small, rather slender, with four irregular apical digits. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter; skin pilose; tracheæ broad; lateral hairs multiple on first abdominal segment, triple on second, double on third to sixth. Air-tube long, uniformly but slightly tapered, five times as long as wide; pecten reaching to basal third; single tooth broad, with three to five branches. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at tip, fringed with spinules. Anal segment longer than wide, ringed by the plate, with a row of short spines on posterior margin; dorsal tuft of three long hairs on each side; ventral brush well developed, confined to the barred area. Anal gills about as long as the segment, tapered, the tips rather bluntly rounded.

The larvæ live in ground-pools. Mr. Busck got them in a lagoon-pool of dirty, ill-smelling water distant from habitations.

Island of Trinidad, West Indies.

Larvæ in a lagoon-pool, June 20, 1905 (A. Busck).

CULEX INQUISITOR Dyar & Knab.

Culex inquisitor Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 211, 1906.

ORIGINAL DESCRIPTION OF CULEX INQUISITOR:

Antennal tuft well outward, the whole member dark; head hairs in threes; lateral abdominal hairs in twos after the first segment. Air tube five times as long as wide, the pecten short and reaching nearly to the middle. Anal gills long and pointed.

Collected by Mr. Busck in a manure ditch behind a stable, Cedros, Trinidad, and in pods of cocoa in "stinking black half solid water" in Dominica. The eggs are laid in boats. Also obtained by the junior author in Santa Lucrecia, Mexico, and Puntarenas, Costa Rica. All the adults were labeled "*Culex secutor* Theob." by Mr. Coquillett.

Digitized by Google

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender.. 5
5. Air tube four times as long as wide or over..... 7
7. Anal appendages four, normal..... 8
8. Air tube with three paired tufts posteriorly outwardly, the middle one moved laterad out of line, usually situated near or not much beyond the middle of the tube..... 9
9. Body spicular or pilose..... 10
10. Dislocated tuft of tube not, or scarcely beyond the middle..... 11
11. Anal processes long and tapered, rather sharply pointed..... 13
13. Air tube regularly tapered on outer two-thirds to tip; pecten long but not equaling half the diameter of the tube..... *inquisitor*

DESCRIPTION OF FEMALE AND LARVA OF CULEX INQUISITOR (MALE UNKNOWN):

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture bronzy brown, darker towards tip; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small and slender, one-fifth as long as proboscis, black, with a few outstanding setæ. Antennæ with basal joints somewhat shorter than apical ones, rugose, pilose, black, second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, brown, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed with narrow, curved pale-brown scales on vertex, broad, flat white ones on sides, margin of eyes white; many erect, forked dark-brown scales on nape; a row of brown bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and brown setæ. Mesonotum brown, with two dorsal impressed lines very narrow and nearly invisible; vestiture of narrow, curved lustrous-brown scales, those around the ante-scutellar space paler, the setæ coarse and brown. Scutellum trilobate, clothed with narrow, curved, pale scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, grayish, nude. Pleuræ and coxæ brownish luteous, with patches of shining white scales and rows of short, pale bristles.

Abdomen subcylindrical, depressed, truncated at tip; dorsal vestiture dark, with a strong coppery luster, a soiled-white band at the bases of the segments except the first and second, joining a row of lateral triangular segmental spots; venter clothed with yellowish-white scales, without distinct bands; a row of yellowish hairs at tip of each segment dorsally.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell a little shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales brown, with a bronzy luster on costa, linear, denser towards apex, especially on forks of second vein. Halteres whitish.

Legs moderate, femora whitish beneath nearly to tip; tips of hind tibiæ pale; tibiæ and tarsi bronzy brown, paler beneath; hind tarsi with very narrow white rings at base and apex at each joint; first three joints of fore and mid tarsi white-marked. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Larva, Stage IV (plate 97, fig. 318).—Head rounded, transverse, widest through eyes, a large notch at insertion of antennæ, the front margin arcuate; both pairs of head-tufts in threes, ante-antennal tufts multiple. Antennæ large, slightly curved, basal two-thirds thick and well spined, with a large tuft from a notch; two long subapical setæ, a long seta, a short seta, and a digit at tip. Mental plate triangular, straight on the sides; a large central tooth and nine on each side, next to basal one large and slightly projecting. Mandible quadrangular; two long filaments, a short one and a tuft of hairs before tip; an

Digitized by Google

outer row of cilia from a collar; a row of rounded transverse prominences on outer margin bearing hair-tufts; dentition of four teeth on a process, the first longest; a spine before, a small tooth and a large trifid one at base, a long, smooth filament and a row of feathered hairs within; process below slightly curved, obscurely furcate, with a longitudinal and a transverse row of hairs; basal angle small, the row of hairs within with enlarged dentate bases; a row of long hairs at base. Maxilla elongate, with conical tip, divided by a suture; inner half with a row of long hairs on margin, some of the basal ones feathered, two rows of cilia within; a row of long hairs at tip, running down along the suture; outer half with two filaments near the middle, a spine on other side and small granules on margin. Palpus small, with four rather long, irregular digits. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter, lateral hairs multiple on first segment, double on second to sixth; skin pilose; tracheæ rather broad. Air-tube long, slightly tapered, five times as long as wide; pecten reaching basal two-fifths; single teeth broad, with five to seven branches; three two-haired tufts, the middle one placed laterally. Lateral comb of eighth segment of many spines in a large triangular patch; single spine widened outwardly, with an apical fringe of spinules. Anal segment longer than wide, ringed by the plate, which has a row of small spines on the posterior margin; dorsal tuft a group of long hairs on each side; a single lateral hair; ventral brush well developed, confined to the barred area. Anal gills long, twice as long as the segment, gradually tapered.

The larvæ live in ground-pools of dirty water. Mr. Busck got them in a stagnant ditch containing horse-manure.

Island of Trinidad, West Indies.

Montserrat (Trinidad), larvæ in a ditch, June 27, 1905 (A. Busck).

The specimens originally referred here from Dominica, Mexico, and Costa Rica have, upon further study of the material, been transferred to *Culex vindicator, Culex proclamator,* and *Culex jubilator,* respectively. The specimens which we determined for Mr. Busck, from Panama, as this species, we have lately transferred to *Culex revelator.* We have now before us but the single female type from Trinidad. These species are all closely allied, with but slight differences both as adults and larvæ. They separate well, however, by our tables.

CULEX JUBILATOR Dyar & Knab.

Culex inquisitor Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 211, 1906.
Culex jubilator Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 201, 1907.
Culex jubilator Busck, Smiths. Misc. Colls., quart. iss., iii, 68, 1908.
Culex jubilator Theobald, Mon. Culic., v, 614, 1910.

ORIGINAL DESCRIPTION OF CULEX JUBILATOR:

♀.—Proboscis rather long and slender, not swollen towards the apex, clothed with black scales, not ringed; palpi short, black scaled; occiput clothed with narrow yellowish scales, margin of the eyes narrowly white, the upright forked scales brown with yellow luster; mesonotum light brown with golden luster; pleura pale gray; abdomen subcylindrical, truncate at apex, black scaled above with faint bronzy luster, segments 2 to 7 with a median basal triangular spot of white scales, the spots on the posterior segments smaller, eighth segment with a white basal band, which is laterally enlarged, a row of white lateral spots, ventral area white scaled; legs black with bronzy luster, the tarsi with very narrow yellowish-white rings at both ends of the joints, last joint of hind tarsi narrowly whitish tipped; claws simple; scales of the wing-veins brown, long and narrow. Length 3 mm.

♂.—Palpi considerably longer than the proboscis, the apical half with numerous long brown hairs, wholly brown scaled, without rings; antennæ strongly plumose; abdomen slender, depressed, dark-scaled above with faint bronzy luster, the segments with silvery-white basal bands which are produced triangularly in the middle, eighth segment entirely white scaled. Length 3.5 mm.

Digitized by Google

Sixteen specimens, Taboga Island, Panama (A. H. Jennings, collector), bred from larvæ in water in old tubs in a pasture near the bathing beach.

Type.—No. 10916, U. S. National Museum.

The larva is very close to that of *Culex carmodyæ* Dyar & Knab, but has the pecten of the air-tube longer.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX JUBILATOR:

Female.—Proboscis moderately slender, uniform, labellæ conically tapered; vestiture brownish black, darker towards tip, labellæ pale, with short outstanding setæ. Palpi short, one-sixth as long as proboscis, dark brown. Antennæ rather long, the joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, dark brown. Clypeus rounded triangular, dark brown, nude. Eyes black. Occiput blackish, clothed with narrow, curved golden-brown scales and numerous erect, forked black ones on vertex; broad, flat white ones on sides, margin of eyes white scaled.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow, curved pale-brown scales and black bristles. Mesonotum blackish brown, clothed with narrow, curved golden-brown scales, somewhat more yellowish on anterior edge and around ante-scutellar space; bristles long and black. Scutellum trilobate, clothed with narrow, curved pale-yellowish scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ gray, coxæ luteous, with a few rather narrow, elliptical, whitish scales and fine pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black, with a row of segmental basal median triangular white spots, those on terminal segments narrow, resembling bands; a row of lateral basal triangular white spots; first segment entirely dark scaled above; venter whitish scaled, tips of basal segments blackish.

Wings moderate, hyaline; petiole of second marginal cell about one-fifth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins outstanding, dense, especially on forks of second and fourth veins, narrowly linear, brown, those on costa black with a blue reflection. Halteres whitish, with brownish knobs.

Legs moderate, the femora white beneath nearly to tip, black above, knees white; tibiæ and tarsi black, tibiæ whitish beneath, hind tarsi with very narrow white rings at base and apex of each joint; mid tarsi without rings at end of fourth and on fifth joints; fore tarsi unbanded. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 3 mm.

Male.—Palpi exceeding the proboscis by more than length of last joint, end of long joint and the last two joints with numerous long black hairs, the penultimate slightly thickened; vestiture uniformly bronzy brown. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertions of hair whorls; hairs long, dense, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, vestiture less abundant. Abdomen elongate, subcylindrical and slender on basal half, depressed and laterally expanded towards apex; the dorsal white spots large and almost forming bands on third, fourth, and fifth segments, obsolete on seventh, eighth segment wholly white-scaled; lateral ciliation long, fine, pale yellowish. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 14, fig. 100): Side-pieces over twice as long as wide, slender, conically tapered at base and apex, a slight prominence at outer fourth, bearing three rods with hooked tips, a large leaf-like appendage, a small expanded

Digitized by Google

appendage somewhat within, and a seta. Clasp-filament stout, a little swollen mesially, bearing a small terminal claw and two minute setæ, these latter inserted inwardly below the tip. Harpes divided, inner limb stout and with a crown of spines, outer blade-like and somewhat curved. Harpagones divided into several lamellæ, which form an irregular series of angular prominences.

Larva, Stage IV (plate 96, fig. 314).—Head rounded, wider than long, prominent in region of eyes; antennæ long and slender, a large hair-tuft at outer third, the part beyond more slender than the basal part, the shaft minutely spined; two of the terminal hairs slightly more basal than the terminal one; both pairs of head-tufts in threes, the ante-antennal tufts multiple. Thorax with skin finely spiculate, abdomen smooth; lateral hairs in fours and threes on first two segments, double on second to fifth, single on sixth; lateral comb of eighth segment of many spines in a large triangular patch. Air-tube over five times as long as wide, gradually tapering throughout; pecten reaching the basal third, of about 14 teeth, the distal ones gradually longer and curving toward side of tube; a tuft just beyond pecten, a second more dorsal in position, of three hairs, the third subapical, of four hairs; terminal hooks minute. Anal segment longer than wide, ringed by the plate; dorsal tuft of three hairs of different lengths on each side; lateral hair small, single; ventral brush large, confined by the chitinous ring. Anal gills rather short, tapering, equal.

The larvæ live in ground-pools. Mr. Jennings got them in an old tub in a pasture and from a slowly-running stream. The species appears to be sporadic in appearance, as Mr. Busck mentions that it was not found when he first visited the locality with Mr. Jennings, but was only obtained on Mr. Jennings's second visit 6 weeks later. Mr. Knab obtained the larva in a pool in a cattle pasture which was partly shaded by a large tree.

Panama and Costa Rica.

Taboga Island, Panama Bay, Panama, bred from larvæ (A. H. Jennings); Las Loras, near Puntarenas, Costa Rica, bred from larvæ, September 18, 1905 (F. Knab); La Boca, Canal Zone, Panama (A. H. Jennings).

CULEX REVELATOR Dyar & Knab.

Culex revelator Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 202, 1907.
Culex inquisitor Busck (not Dyar & Knab), Smiths. Misc. Colls., quart. iss., iii, 66, 1908.
Culex revelator Busck, Smiths. Misc. Colls., quart. iss., iii, 69, 1908.
Culex factor Busck (not Dyar & Knab), Smiths. Misc. Colls., quart. iss., iii, 70, 1908.
Culex revelator Theobald, Mon. Culic., v, 614, 1910.

ORIGINAL DESCRIPTION OF CULEX REVELATOR:

♀.—Proboscis rather long and slender, not swollen at apex, brown scaled, not ringed; palpi short, black scaled; occiput brown scaled, ocular margin white; metanotum golden-brown scaled, pleura pale greenish gray; abdomen subdepressed, truncate at the tip, clothed above with black scales with bronzy and blue luster, the second and third segments with a median, basal, small patch of white scales, the succeeding segments banded, the bands broadest at middle, much narrower at the sides, on the banded segments the bands are broadened laterally towards the ventral area; beneath entirely white scaled; legs dark with bronzy luster, the tarsi narrowly ringed with yellow-white at both ends of the joints; the tip of the last joint of the hind tarsi white; claws simple; wing-scales brown, long, and narrow. Length 3 mm.

♂.—Palpi considerably longer than the proboscis, brown scaled with bronzy and bluish luster, the apical half with numerous long blackish hairs; antennæ amply plumose; abdomen long and slender, the segments with moderately broad basal silvery-white bands, those on the sixth and seventh segments dilated at the sides. Lateral cilia long, moderately abundant, pale brown. Length, 3.5 mm.

Four specimens, Taboga Island, Panama (A. H. Jennings, collector), bred from larvæ found in a boat containing water.

Type.—No. 10917, U. S. National Museum.

The larva is allied to *Culex proclamator* D. & K. and *C. inquisitor* D. & K., but differs from both in having the basal tuft of the tube well within the pecten.

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX REVELATOR:

Female.—Proboscis moderately slender, uniform, labellæ conically tapered; vestiture brownish black, darker towards tip, labellæ with short outstanding setæ. Palpi short, one-fifth as long as proboscis, dark brown. Antennæ moderate, joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, dark brown. Clypeus rounded triangular, dark brown, nude. Eyes black. Occiput blackish, clothed with narrow, curved golden-brown scales and numerous erect, forked black ones on vertex, broad, flat white ones on sides; margin of eyes white scaled.

Prothoracic lobes elliptical, remote dorsally, with brown bristles. Mesonotum blackish brown, clothed with narrow, curved coppery-brown scales, somewhat more yellowish on anterior edge and around ante-scutellar space, the bristles long and black. Scutellum trilobate, clothed with narrow, curved pale-yellowish scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ gray and luteous, coxæ luteous, with a few rather narrow elliptical whitish scales and fine pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black, with a row of basal segmentary narrow bands, triangularly widened in the middle, joining a row of lateral white spots; first segment dark scaled dorsally; venter brownish-yellow scaled, without distinct bands.

Wings moderate, hyaline; petiole of second marginal cell about one-fifth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins outstanding, dense, most so on fork of second vein, narrowly linear, brown, black along costa with a blue reflection. Halteres whitish, with brownish knobs.

Legs moderate; femora white beneath nearly to tip, black above, knees narrowly white; tibiæ and tarsi brown, tibiæ pale beneath, hind tarsi with very narrow white rings at base and apex of each joint; front and mid tarsi with the first four joints narrowly white marked. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3.2 mm.

Male.—Proboscis slightly thickened toward apex, with a pale shade beneath in the middle. Palpi exceeding the proboscis by more than the length of the last joint; end of long joint and last two joints with numerous long black hairs, the tip of long joint and penultimate slightly thickened; vestiture entirely blackish above with bronzy and blue luster, beneath with pale shining scales. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others shorter, slender, brownish, with black rings at insertions of hair-whorls; hairs long, dense, brown. Coloration similar to the female. Wings slightly narrower than in the female, the stems of the fork-cells longer; vestiture less abundant. Abdomen long, slender, depressed apically; dorsal bands broader, not produced at middle, the white scales predominating on eighth segment; lateral ciliation long, dense, pale brown. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 16, fig. 114): Side-pieces three times as long as wide, uniform, curved, rounded at tip; a rounded prominence at outer third bears three rods, a large leaf-like appendage, a smaller appendage somewhat within, and a seta. Clasp-filament slender, a little enlarged at base with a small terminal claw. Harpes divided, inner limb stout and bearing a crown of spines, outer limb blade-like and curved. Harpagones divided into several lamellæ. Basal lobes illy developed, each bearing three small setæ.

Larva, Stage IV (plate 97, fig. 320).—Head rounded, wider than long, prominent laterally in region of eyes; antennæ large, spicular, the tuft at outer third, the part beyond it slender; both pairs of dorsal tufts long, in threes, ante-antennal tuft multiple. Skin spicular; lateral abdominal hairs double on

Digitized by Google

segments 3 to 5, single on sixth. Lateral comb of eighth segment of many spines in a triangular patch. Air-tube about five times as long as wide, uniformly tapering; pecten reaching almost to middle of tube, the teeth longer outwardly and retreating a little towards the dorsal aspect; a two-haired or single tuft just within the pecten; a three-haired tuft near middle of tube placed toward the dorsal aspect, subapical tuft three-haired; terminal hooks small. Anal segment about twice as long as wide, ringed by the plate, which is slightly spicular on its posterior border; dorsal tuft of three hairs of different lengths on each side; ventral brush large, confined by the chitinous ring. Anal gills moderate, pointed, one of them usually very large, three times as long as the others and extending far behind.

The larvæ live in the edges of streams and pools where protected by grass or other vegetation. Mr. Busck and Mr. Jennings both obtained them in such locations several times.

Panama.

Taboga Island, Panama Bay (A. H. Jennings); Las Cascadas, Canal Zone (A. H. Jennings); Pedro Miguel, Canal Zone, April 24, 1907 (A. Busck); upper Chagres River, June 7, 1907, associated with *Culex coronator* (A. Busck); Pedro Miguel, Canal Zone, larvæ in a receptacle, November 29, 1907 (A. H. Jennings); Paraiso, Canal Zone, larvæ in a pool on the face of a landslide, December 16, 1907 (A. H. Jennings). Also recorded by Mr. Busck from bromelias (under the title *Culex factor*), but we think so recorded through some error.

Some of the specimens now included under *Culex revelator* were at first wrongly determined for Mr. Busck as *Culex inquisitor* and a record of them published by him under that name. The single adult which we determined for Mr. Busck as *Culex factor*, is also properly referable here. The specimen is a variant, having lost the white rings on the tarsi and hence fell wrongly by our tables. We have questioned Mr. Busck on the subject, and he feels sure that all the specimens under his No. 104 came from water in the leaves of a bromeliaceous plant on the upper Chagres River, which he collected during his first trip by canoe. Mr. Busck met with an accident on the trip, his boat being overturned, but the valise containing the larvæ was recovered with these specimens intact. No isolations were obtained from the No. 104 culture, but two species of larvæ occurred in it. One is *Culex jenningsi*, the other *Culex revelator*. We think the single bred adult is of the latter species, as it agrees entirely with normal adults, except for the absence of the white rings on the tarsi. This is a variation that occasionally occurs; besides, we notice on very careful examination slight traces of these markings. Further, the specimen was killed too soon after emergence, and the colors are not quite fully developed. The only abnormal circumstance, which we can not explain, is the apparent occurrence of these larvæ in bromelias. We know of no other case where a species addicted to ground-pools has been also found, even occasionally, in bromelias. The bromelias contain, besides their special inhabitants, the species of the group *Microculex* (of which *Culex jenningsi* is one), also other species of *Culex;* but these have never been taken except in the bromelias, and their larvæ could not be confused with this species. We are, therefore, inclined to the opinion that some error has entered into the breeding records in this instance.

CULEX LAMENTATOR Dyar & Knab.

Culex lamentator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 219, 1906.
Culex lamentator Dyar, Proc. Ent. Soc. Wash., viii, 17, 1906.

ORIGINAL DESCRIPTION OF CULEX LAMENTATOR:

Antennæ with the tuft but slightly beyond the middle, dark; head hairs in threes; body granular, subspicular; lateral hairs in twos after the first segment; trachese

Digitized by Google

broad. Air-tube 6 × 1, with six tufts along posterior line; pecten reaching a little over one-fourth. Lateral comb of the eighth segment large; gills moderate.

Collected by Mr. Busck in a hollow palm trunk in the San Francisco Mts., San Domingo. It was named "*Culex secutor* Theob." by Mr. Coquillett; it should be regarded as a distinct, but allied species, representing the Jamaican form in San Domingo.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent	18
18.	Air tube without a crown of spikes, smooth throughout	19
19.	Air tube with long well-defined tufts	20
20.	Body glabrous or lightly granular	26
26.	Air tube regularly tapered, the tip not widened	28
28.	Both head hairs triple or multiple	29
29.	Lateral abdominal hairs in twos after the second segment; body spicular-granular; air tube 6 × 1	30
30.	Air tube with six to seven sparse tufts; antennæ dark; dorsal tufts of anal segment 1 long + 1 long and one short	*lamentator*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX LAMENTATOR:

Female.—Proboscis moderate, subcylindrical, scarcely expanding to tip, labellæ paler, conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small and slender, one-fourth as long as proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter, rugose, pilose, black, second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed with narrow, curved, lustrous pale-brown scales with broader scales at sides; whitish in a narrow margin behind eyes and at sides below; many erect, forked black scales on nape; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote, dorsally, clothed with pale scales and black setæ. Mesonotum brown, with two dorsal impressed lines running the whole length; vestiture of narrow, curved lustrous-brown scales; those along anterior and lateral margins, around ante-scutellar space and two dots on disk yellowish, bristles black, numerous. Scutellum trilobate, brown, clothed with yellowish scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ blackish, with small patches of white scales and with rows of small brown bristles, coxæ tinted with greenish.

Abdomen subcylindrical, depressed, truncated at tip; dorsal vestiture black, with a slight greenish-metallic reflection, a narrow white band at base of each segment but the first, joined to lateral rows of basal segmentary triangular spots; venter tinted with green, transverse yellowish-white scaled, with black bars at tips of segments and a row of sub-basal black spots; a row of whitish hairs at tip of each segment dorsally.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell a little shorter than its cell; basal cross-vein four times its own length distant from anterior cross-vein; scales blackish brown, outstanding one broadly linear, very dense on forks of second vein. Halteres whitish, dark at tip.

Legs moderate, femora white beneath almost to tip; tibiæ white at apices, tarsi bluish black, with a slight metallic reflection, with narrow white bands at base and apex of each joint; mid tarsi with last joint dark at tip; fore tarsi with the rings nearly obsolete; knees white. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

Digitized by Google

Male.—Proboscis straight, longer than in female, a broad pale ring beyond middle, slightly enlarged towards apex. Palpi exceeding proboscis by nearly the length of last joint, end of long joint and last two joints with long, dense brown hairs; vestiture of dark-bronzy scales, a pale ring on the long joint before the middle, a few pale scales at base of penultimate joint. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertion of hair-whorls; hairs long, dense, dull brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells a little longer, vestiture more sparse. Abdomen long, slender, depressed and expanded towards apex; dorsal white bands distinct on second to fifth segments, obsolete on sixth and seventh; lateral ciliation long and abundant, pale brownish yellow. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 16, fig. 118): Side-pieces over twice as long as wide, conically tapered at tip; marginal appendages on a subapical truncated prominence consisting of three rods with hooked tips and a leaf-like appendage and a seta. Clasp-filament stout, rather long, curved, with a small articulated appendage. Harpes furcate, lower branch curved with a rounded tip, outer bearing a dense terminal tuft of spines. Harpagones furcate, divided into numerous teeth.

Larva, Stage IV (plate 107, fig. 357).—Head rounded, wider than long, eyes bulging at the sides; both pairs of dorsal tufts in threes, ante-antennal tufts multiple. Antennæ elevated on a triangular insertion, long, curved, terminal third narrow, at its base bearing a very large tuft of feathered hairs, below which the thick basal part is densely spined; three long setæ, a short one, and a digit on a pedestal at tip. Mental plate quadrate, a little expanded outwardly; a stout central tooth and eight on each side, the penultimate one a little larger and distinctly separated. Mandible quadrangular, nearly square; two large filaments and two small ones from a notch before tip; an outer row of cilia from a collar; outer margin straight, with nine tufts of fine hairs; dentition projected in line with margin, of four teeth on a process, the first the longest; two spines before, a large trifid tooth at base, a broad serrate filament and a row of feathered hairs within; process below long, furcate, with four tufts of hair; basal angle small but sharp, with three long hairs within; a row of five hairs at base. Maxilla conical, divided by a suture; inner half rather densely haired; a tuft of long hairs at tip, running down along the suture nearly to base; outer half with two filaments below the middle and a spine on the other side. Palpus small, slender, with four irregular terminal digits. Thorax rounded, subquadrate, wider than long; hairs abundant, long. Abdomen moderate, anterior segments short and transverse; lateral tufts multiple on first segment, triple on second, double on third to sixth. Tracheal tubes slender. Air-tube long, about six times as long as wide, uniformly and very slightly tapered; pecten small, reaching about one-fourth the length of tube, followed by five or six hair-tufts along posterior edge; pecten tooth a moderate spine with wide base, from which arise two or three long branches. Lateral comb of eighth segment of numerous scales in a triangular patch; single scale elongate, uniform, with a triangular base, entirely fringed by uniform spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft of long hairs; ventral brush well developed, placed in an excision in the chitinous ring, not exceeding the barred area. Anal gills small, tapered, not longer than the segment.

Mr. Busck found the larvæ abundantly in water in a hollow palm-trunk and less abundantly in a pot-hole in coral rock in woods, in the latter case associated with *Psorophora infine.*

Island of Santo Domingo, West Indies.

Santo Domingo, larvæ in a hole in a rock, August 9, 1905 (A. Busck); San

Digitized by Google

Francisco Mountains, larvæ in a hollow tree, August 28, 1905; also many captured adults, September, 1905 (A. Busck).

CULEX PROCLAMATOR Dyar & Knab.

Culex proclamator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 211, 1906.
Culex inquisitor Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 211, 1906.

ORIGINAL DESCRIPTION OF CULEX PROCLAMATOR:

Antennal tuft at the outer third, the member dark; head hairs in threes; body pilose; tracheæ broad. The subdorsal hairs of the abdominal segments are very long. Air tube five times as long as wide, strongly tapered outwardly, the apical third nearly straight; pecten very long and running to one-half.

Collected by the junior author at Santa Lucrecia and Almoloya, Mexico; Puntarenas, Costa Rica.

The adults were named "*Culex ? salinarius* Coq." and "*Culex ? secutor* Theob."

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with three paired tufts posteriorly outwardly, the middle one moved laterad out of line, usually situated near or not much beyond the middle of the tube	9
9.	Body spicular or pilose	10
10.	Dislocated tuft of tube not, or scarcely beyond the middle	11
11.	Anal processes long and tapered, rather sharply pointed	13
13.	Air tube very slightly flared at tip; pecten very long, as long as the diameter of the tube at the middle	*proclamator*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX PROCLAMATOR:

Female.—Proboscis moderate, subcylindrical, scarcely expanding to tip, labellæ conically tapered; vestiture bronzy brown, darker at tip, a pale shade below at middle; setæ minute, curved, black, those on labellæ are more prominently outstanding. Palpi small and slender, one-fifth as long as proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter, rugose, pilose, black, second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed with narrow, curved, lustrous pale-brown scales, broad white ones on sides and many erect, forked brown ones on vertex, margins of eyes moderately broadly white scaled; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with brown setæ. Mesonotum light brown, with a narrow median bare stripe and two subdorsal impressed paler brown lines showing on the anterior half; vestiture of narrow, curved, lustrous light-brown scales, paler around the ante-scutellar space; bristles brown, numerous. Scutellum trilobate, luteous, clothed with pale shining scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ luteous, pleura tinged with green, small patches of white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncated at tip; dorsal vestiture dull black, with a slight greenish reflection, a row of lateral basal segmental triangular white spots, showing posteriorly from a dorsal view, and a row of narrow basal bands mesially produced of dirty-white scales; first segment dark scaled dorsally; venter whitish scaled; a row of whitish hairs at tip of each segment dorsally.

Wings moderate, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales blackish brown, the outstanding ones linear, very dense on forks of second vein. Halteres whitish.

Digitized by Google

Legs moderate, femora whitish beneath almost to tip; knees white; tibiæ and tarsi brownish black with a slight brassy reflection beneath; hind tarsi with very narrow yellowish-white bands at base and apex of each joint; mid tarsi with the first three joints white-marked; front tarsi unmarked; apices of tibiæ yellowish white. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis straight, thickened towards apex, bronzy brown, without distinct pale markings. Palpi exceeding the proboscis by the length of the last two joints; end of long joint and last two joints with long, dense, black hairs; vestiture black with bronzy luster, a very narrow white ring below middle of long joint, a patch of whitish scales at base of penultimate joint. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertion of hair-whorls; hairs long, dense, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells a little longer; vestiture sparse. Abdomen elongate, depressed on apical half; dorsal white bands broad on basal segments and hardly mesially produced, narrower on sixth and seventh segments and produced on the sides; lateral ciliation long, dense, fine, pale. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 15, fig. 113): Side-pieces over twice as long as wide, conically tapered at tip; marginal appendages on a subapical truncated prominence consisting of three rods with hooked tips and a leaf-like appendage and two setæ. Clasp-filament stout, rather long, curved, with a small articulated appendage. Harpes furcate, lower branch curved, with a rounded tip, outer bearing a dense terminal tuft of spines. Harpagones furcate, divided into numerous teeth.

Larva, Stage IV (plate 97, fig. 319).—Head rounded, widest through eyes, a large notch at insertion of antennæ, front margin arcuate; both pairs of dorsal hairs in threes, ante-antennal tuft multiple. Antennæ large, slightly curved, basal two-thirds thick and well spined, terminated in a notch with a large hair-tuft; two long setæ subapically, a long seta, a short seta, and a digit on a pedicel at tip. Mental plate triangular, straight on the sides; a large central tooth and nine on each side, the last one small, the two before distinctly projecting. Mandible elongated, quadrangular; two filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of rounded transverse prominences on outer margin bearing hair-tufts; dentition of four teeth on a process, the first longest; a spine before, a small tooth and a larger trifid one at base, a long smooth filament and row of feathered hairs within; process below curved, obscurely furcate, with a transverse and a longitudinal row of hairs and a tuft at tip of each limb; basal angle small, a row of stout hairs within with enlarged feathered bases; a row of long hairs at base. Maxilla elongate, conically tapered, divided by a suture; inner half with a row of long spines on inner margin, some of the basal ones shortly feathered, two rows of setæ within; a row of long hairs at tip running down along the suture; outer half with two filaments at middle, a subapical spine on the outer side and slight irregularities on outer margin. Palpus small, rather slender, with four irregular apical digits. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter; skin pilose; tracheæ broad; lateral hairs apparently in twos (broken); subdorsal hairs very long. Air-tube long, strongly tapered to about the middle, then straighter, five times as long as wide; pecten very long, running nearly to middle; single teeth rather wide, with about five branches, except toward the apex, where the teeth become thickened and spine-like, the branches reduced and apically placed; a hair at end of pecten, another beyond, somewhat laterally placed, a subapical tuft. Lateral comb of eighth segment of many spines in a

Digitized by Google

triangular patch; single spine elongate, widened at tip, fringed with spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft a group of long hairs on each side; ventral brush well developed, confined to the barred area. Anal gills longer than the segment, rather sharply tapered.

The larvæ live in ground-pools. Mr. Knab found them in an old tank about 2 feet square at the river margin under a bridge, in a large muddy puddle in the bed of a stream in a well-shaded ravine, and in a shallow pool frequented by cattle, partly shaded by a large tree.

Mexico and Costa Rica.

Santa Lucrecia, Mexico, June 19, 1905 (F. Knab); Almoloya, Oaxaca, Mexico, July 19, 1905 (F. Knab); Las Loras, near Puntarenas, Costa Rica, September 9, 1905 (F. Knab).

One of the Santa Lucrecia specimens was originally referred to *Culex inquisitor*, through an error.

CULEX TOWERI Dyar & Knab.

Culex towerí Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 13, 1907.
Culex towerí Theobald, Mon. Culic., v, 613, 1910.

ORIGINAL DESCRIPTION OF CULEX TOWERI:

Head behind the eyes margined with silvery gray; thorax clothed with rather pale yellowish brown scales above with faint traces of dorsal stripes; abdomen entirely black above, beneath with white lateral basal spots and a pale median area. Wings with the veins and fringe dark brown scaled. Hind legs black with the first to fourth tarsal joints narrowly white ringed at both ends, fifth joint white ringed at the base; knees white tipped, tibiæ rather broadly white tipped; on the first and second pairs of legs the annulations are much reduced. Proboscis and palpi black.

39 specimens, Mayaguez, Porto Rico (W. V. Tower).

***Type*.—Cat. no. 10222, U. S. Nat. Mus.**

The larva falls with *Culex lamentator* D. & K. in the table and is much like it, but the adults are quite distinct.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX TOWERI:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ pale, conically tapered; vestiture brownish black, setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi small and slender, about one-fourth as long as the proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter, rugose, pilose, black, the second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed with narrow, curved, lustrous pale-brown scales on vertex and many erect, forked ones, pale brown mesially, black at sides, broad white ones on sides below; a row of black bristles along margins of eyes, which are white scaled.

Prothoracic lobes elliptical, remote dorsally, clothed with white scales and brown setæ. Mesonotum light brown, with two dorsal, impressed, paler brown lines showing on anterior half; vestiture of narrow, curved, lustrous light-brown scales, paler around the margins and ante-scutellar space, in a median line and a pair of subdorsal spots; bristles black. Scutellum trilobate, brown, clothed with pale scales, each lobe with a group of blackish bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ luteous, with small patches of white scales and with rows of small brown bristles.

Abdomen subcylindrical, depressed, truncated at tip; dorsal vestiture black with a slight greenish and bronzy reflection, a row of lateral basal-segmental, triangular, dull silvery-white spots showing posteriorly from a dorsal view; venter whitish, with transverse black bars at tips of segments; a row of yellowish hairs at tip of each segment dorsally.

Digitized by Google

Wings moderate, hyaline; petiole of second marginal cell less than half as long as its cell, that of second posterior cell about as long as its cell; basal cross-vein twice its own length distant from anterior cross-vein; scales blackish brown, the outstanding ones linear, densest on forks of second vein. Halteres whitish.

Legs moderate, femora white beneath almost to tip; knees white; tibiæ and tarsi brownish black, with a slight bluish and bronzy reflection; tarsi with white bands at base and apex of each joint, very narrow in fore and mid tarsi, rather broad on hind; tips of tibiæ white. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3.5 mm.

Male.—Proboscis straight, enlarged towards apex, vestiture black, with an indistinct paler ring near middle. Palpi exceeding the proboscis by more than the length of the last joint, bronzy brown, end of the long joint and last two joints with long, dense, black hairs, the long joint with a white ring at basal third and a broad pale shade on apical third. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertion of hair-whorls; hairs long, dense, dull brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells a little longer, vestiture more sparse. Abdomen long, slender, with distinct white bands at bases of segments dorsally; lateral ciliations long but rather irregular, pale yellowish. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 16, fig. 117): Side-pieces over twice as long as wide, conically tapered at tip; marginal appendages on a subapical, low, rounded prominence consisting of three rods with hooked tips and a leaf-like appendage and a seta. Clasp-filament slender, rather long, curved, with a small articulated appendage. Harpes furcate, lower branch curved, with a rounded tip, outer bearing a dense terminal tuft of teeth with one large one. Harpagones furcate, the outer one divided into five short teeth. Basal appendages rounded, setose, very short.

Larva, Stage IV (plate 107, fig. 358).—Head rounded, widest through eyes: antennæ long, a tuft at outer third, part beyond slender; shaft dark throughout, spicular; both pairs of dorsal head-hairs in threes. Body glabrous, lateral hairs in twos after second segment; lateral comb of eighth segment of many spines in a large triangular patch. Air-tube about six times as long as wide, pecten small and covering basal fourth; eight tufts approximately in line along posterior margin. Anal segment a little longer than wide, ringed by the plate; dorsal tuft of three hairs of different lengths on each side; ventral brush large, confined by the chitinous ring. Anal gills moderate, upper pair nearly twice as long as the lower pair, all with rounded tips.

The larvæ frequent water in artificial receptacles and probably also pools or tree-holes. Mr. Tower obtained them in tubs which he exposed for the purpose of obtaining mosquito larvæ.

Island of Porto Rico, West Indies.

Mayaguez, September (W. V. Tower).

CULEX SECUTOR Theobald.

Culex secutor Theobald, Mon. Culic., ii, 321, 1901.
Culex secutor Giles, Gnats or Mosq., 2 ed., 406, 1902.
Culex secutor Theobald, Mon. Culic., iii, 183, 1903.
Culex secutor Blanchard, Les Moustiques, 300, 1905.
Culex secutor Dyar, Journ. N. Y. Ent. Soc., xiii, 26, 1905.
Culex secutor Theobald & Grabham, Mosq. or Culic. Jamaica, 22, 1905.
Culex secutor Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 219, 1906.
Culex secutor Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 23, 1906.
Culex quasisecutor Theobald, Mon. Culic., iv, 398, 1907.
Culex secutor Peryassú, Os Culicid. do Brazil, 203, 1908.
Culex secutor Theobald, Mon. Culic., v, 355, 1910.
Culex quasisecutor Theobald, Mon. Culic., v, 355, 1910.

Digitized by Google

ORIGINAL DESCRIPTION OF CULEX SECUTOR:

Head deep brown, with creamy grey scales in the middle, darker round the edge, and upright forked scales projecting out laterally; thorax deep brown, covered with pale golden-brown scales, with two prominent bare lines in the middle in front, slight expanding anteriorly. Abdomen almost black, with traces of white basal banding. Legs deep brown, the anterior and middle unbanded, the posterior with apical and basal banding.

♀. Head deep brown, with narrow curved dull golden-brown scales in the middle, and with deep brown upright forked scales projecting outwards around the paler scaled area; proboscis and clypeus black; palpi covered with deep brown scales, with a small dull basal grey band to the long apical joint and a few gray scales scattered about; antennæ deep brown, with narrow grey bands.

Thorax deep brown almost black, covered with small narrow curved golden-brown scales, in front of the mesonotum are two parallel bare lines which expand a little in front; there is a median double row of black bristles and also lateral rows; scutellum deep brown in the middle, testaceous at the sides, with narrow curved pale golden-brown scales and six nearly black median bristles; metanotum deep blackish-brown; pleuræ brown, with a few small patches of grey scales.

Abdomen black, with black scales, showing violet reflections, the third and fourth segments showing narrow dull white basal bands, the others with traces of dull white basal spots, moderately hairy.

Legs deep brown, fore and mid unbanded, hind banded, the bands involving both sides of the joints; in the fore and mid legs there is a white knee spot and at the apices of the tibiæ are a few white scales and testaceous hairs; ungues of the fore and mid legs equal, simple, curved; in the hind legs the metatarsi and *all* the tarsal joints are apically and basally pale banded; ungues small, equal and simple.

Wings covered along the veins with deep brown typical *Culex* scales; fork-cells rather short, the first sub-marginal a little longer, but no narrower than the second posterior cell; its stem equal to rather more than one-third of the length of the cell, its base a little nearer the base of the wing than that of the latter; stem of the second cell about two-thirds the length of the cell; posterior cross-vein nearly three times its own length distant from the mid cross-vein. Halteres with a fuscous and grey stem and pale ochraceous knob.

Length.—4 mm.

♂. Palpi deep brown, the penultimate joint with a small spot at the base of a pure snowy white, the two apical joints are about equal, rather long and with black hair-tufts, the long antepenultimate joint has a narrow pale ring basally and is hairy at the apex, ground colour ochraceous, which when the palpi are denuded in parts give them a pale banded appearance; antennæ banded dark brown and grey, plume-hairs deep brown; proboscis deep brown, with a narrow pale band on the apical half.

Thorax as in the ♀; abdomen with the second segment mostly grey scaled and the other segments more distinctly banded and with more distinct lateral spots, densely hairy with golden-brown hairs.

Fore and mid legs with small apical banding, hind with the banding as in the ♀, the last tarsal joint rather pale; fore and mid ungues unequal, the larger one uniserrated, the hind equal and simple.

Length.—4 to 4.5 mm.

Habitat.—Jamaica (Grabham) (111).

Observations.—Described from two ♀'s and two ♂'s sent by Dr. Grabham. The specimens were bred from larvæ sent by Mr. Harris from Cinchona, 4900 feet. "I have also caught it," says Dr. Grabham, "in Kingston, where it is especially abundant after the heavy autumnal rains, also an energetic bloodsucker. The insects follow one about in a regular cloud."

Dr. Grabham also sends the larvæ and pupæ.

It is a very distinct species which can at once be told by the thoracic ornamentation and the peculiar banding on the legs.

ORIGINAL DESCRIPTION OF CULEX QUASISECUTOR:

Thorax deep brown with small dull golden-brown scales, collected into two paler spots, with a somewhat pale scaled line extending backwards from them, and traces of pale scales in front over the head, two median short basal lines as in *secutor*. Abdomen deep brown, with basal pale bands. Legs deep brown with prominent apical and basal pale banding to the hind legs, just traces of it on the fore and mid legs. Proboscis unbanded in the female, banded in the male.

♀. Head deep brown with pale grey narrow-curved scales in the middle with creamy reflections, duller at the sides, but smaller and brighter around the eyes, lateral area with flat creamy scales, numerous black upright forked scales espe-

Digitized by Google

cially dense at the sides and with brown chaetæ in front; palpi rather long, deep blackish-brown, proboscis and clypeus deep blackish-brown.

Thorax brown with narrow-curved scales dull golden in some lights, bright bronzy in others, an area of darker ones on each side in front and around the bare space in front of the scutellum some of a similar colour, the scales collect in two denser patches towards the middle of the mesonotum forming two not very prominent pale spots, and they are somewhat denser in a line from each running backwards, and in some specimens the pale scales collect in front over the head to form two spots; as in *secutor* there are two short anterior median parallel bare lines of a dark brown; chaetæ brown; scutellum paler than the mesonotum with paler scales of a golden hue, and six deep brown bristles to the posterior border of the mid lobe; metanotum bright brown; pleuræ pale brown, with grey sheen and patches of rather long flat white scales.

Abdomen deep brown, with basal pale creamy bands, and basal lateral pure white spots and short, pale, golden border-bristles, and some pale golden lateral bristles. The bands on the third to fifth segments most prominent.

Legs deep brown, femora pale grey at base and beneath, in the fore and mid legs there are traces of pale bands to some extent involving both sides of the joints, but mainly apical, more prominent on the mid than fore, in the hind legs the bands are very prominent, and the apex of the last hind tarsal is pale; ungues small equal and simple; knee spot prominent.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem about one-half the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein longer than the mid, sloping backwards, and not quite twice its own length distant from it; halteres pallid.

Length.—4.5 to 4.8 mm.

♂. Palpi acuminate, the two apical segments brown, unbanded, the apical one longer than the penultimate, both with scanty black hair-tufts; the ante-penultimate with a broad creamy band near the apex, and a smaller one towards the base and traces of a still further basal one; proboscis with traces of a pale median band. Fore and mid ungues, unequal, uniserrate.

Wings with the first sub-marginal cell much longer and narrower than the second posterior cell, its base slightly nearer the base of the wing than that of the second posterior, its stem rather more than half the length of the cell, stem of the second posterior cell as long as the cell; posterior cross-vein about two and a half times its length distant from the mid cross-vein. Genitalia with broad, curved claspers, terminal segment slightly expanded apically; the lateral process on the basal lobe with three sword-like bristles and a foliate plate; a comb-like plate of six dark teeth close to the basal process, between it and the clasper.

Length.—4.3 to 4.5 mm.

Habitat.—Newcastle, Jamaica, W. I. (Dr. Grabham).

Observations.—Described from several ♀'s and two ♂'s sent by Dr. Grabham.

It was at first supposed to be *Culex secutor*, but can at once be told by the two pale spots on the thorax, the more prominently banded abdomen and by the apical segment of the male palpi being longer than the penultimate, not the same length as is the case in *C. secutor*. Otherwise strongly resembling *secutor*. It also resembles *Culex janitor*, Theobald, but this species has unbanded abdomen in the female, and the male palpi have the two apical segments equal, and there is only one pale band.

The larvæ, Dr. Grabham writes, are very different from those of *C. secutor*.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX SECUTOR:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture black, setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small and slender, one-fifth as long as proboscis, black, with a few outstanding setæ. Antennæ with the basal joints somewhat shorter, rugose, pilose, black, the second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, luteous, blackish on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Eyes black. Occiput brown, clothed with narrow, curved, lustrous pale-brown scales and many erect, forked black ones on vertex, a large black patch on each side of middle; margins of eyes and sides below dull white scaled; a row of black bristles along margins of eyes.

Digitized by Google

Prothoracic lobes elliptical, remote dorsally, clothed with brown setæ. Mesonotum blackish, with two dorsal impressed lines showing on anterior half; vestiture of narrow, curved, lustrous, dark bronzy-brown scales, narrowly yellowish along anterior lateral margins, a pair of subdorsal, small yellowish spots; bristles black, numerous. Scutellum trilobate, blackish, clothed with narrow, curved, pale scales, each lobe with a tuft of blackish bristles. Postnotum elliptical, prominent, brownish, nude, with a median ridge. Pleuræ brown, with coxæ paler, small patches of narrow white scales, and with rows of small brown bristles.

Abdomen subcylindrical, depressed, truncated at tip; dorsal vestiture black, with a few yellowish-white scales centrally on bases of basal segments, a row of lateral, basal, segmental, triangular white spots showing posteriorly from a dorsal view; venter yellowish white, with transverse black bands at apices of segments, a row of yellowish hairs at tips of segments dorsally.

Wings moderate, hyaline; petiole of second marginal cell one-half as long as its cell, that of second posterior cell a little shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales brown, the outstanding ones broadly linear, those on forks of second vein densest. Halteres whitish, with brownish tips.

Legs slender, femora white beneath towards the base; knees white; tibiæ and tarsi bluish black, the tarsi with very narrow yellowish-white bands at base and apex of each joint, narrower on front tarsi; tips of tibiæ white. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

Male.—Proboscis longer than in the female, straight, slightly enlarged towards apex, black scaled, a pale ring beyond middle. Palpi exceeding proboscis by more than length of last joint, end of long joint and the last two joints with long, dense, black hairs, long joint with a narrow, pale ring at basal third and a broad ring at the apical third, the last two joints white scaled at base. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertion of hair-whorls; hairs long, dense, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells a little longer; vestiture sparser. Abdomen with distinct white bands at bases of segments dorsally, narrower posteriorly and expanded laterally; lateral ciliation dense, shorter and coarser than usual. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 14, fig. 103): Side-pieces over twice as long as wide, conically tapered at tip; marginal appendages on a subapical truncated prominence consisting of three rods with hooked tips and a leaf-like appendage and two setæ. Clasp-filament stout, rather long, curved, with a small articulated appendage. Harpes furcate, lower branch curved with a rounded tip, outer bearing a dense terminal tuft of spines. Harpagones furcate, outer branch divided into four teeth.

Larva, Stage IV (plate 107, fig. 360).—Head rounded, widest through eyes; antennæ large, a tuft at outer third, the part beyond it slender, pale, base and slender part of shaft brown; dorsal head-hairs in threes or fours, ante-antennal tufts multiple. Body slightly granular; lateral abdominal hairs in sixes on first segment, in threes on second, in twos on third to sixth; tracheæ broad; lateral comb of eighth segment of many spines in a large triangular patch. Air-tube six times as long as wide, tapering at outer third; pecten small, extending over basal fourth; ten tufts in line along posterior border beyond pecten, the last one a double hair. Anal segment longer than wide, ringed by the plate; dorsal tuft

Digitized by Google

of 4 hairs of different lengths on each side; ventral brush large, confined by the chitinous plate. Anal gills small, subequal, pointed.

The larvæ live in ground-pools. Dr. Grabham has sent us specimens bred from tanks at Newcastle, elevation 4000 feet, which shows that they will also live in artificial receptacles, as would be expected. Theobald gives the following information, obtained from Dr. Grabham, on the habits:

It is an inland species, and is recorded from Cinchona and Mavis Bank, between 3500 and 4000 feet altitude; a few stray specimens have been taken by Dr. Grabham in the Red Hills and in Kingston. It appears in great numbers at certain times, especially after heavy autumnal rains. Great numbers bred in the pools at the foot of the Red Hills near Kingston in the autumn of 1899. The adults have a slow and clumsy flight, and appear in clouds following one about. It is a persistent and vicious biter, biting during the daytime. The bites cause painful swellings.

Jamaica.

Cinchona, Mavis, Red Hills, and Kingston (Theobald & Grabham); Newcastle, April 10, 1906 (M. Grabham).

Culex quasisecutor differs in having spottings on the mesonotum, a common variation, which occurs in many species of *Culex* and is without specific value. Theobald, in defining this supposed species, mentions also a difference in length in the last joint of the palpi of the male; but this is an illusory character, as it is very difficult to estimate such a proportion in the curved and often shrunken and distorted organ as it occurs in cabinet specimens. Our series of *secutor* received from Dr. Grabham, and bred from the same lot of larvæ, contains both the spotted and unspotted forms. Theobald quotes Dr. Grabham as saying that there are larval differences between the forms, a statement surely due to some error or confusion. The record of the species from São Paulo, Brazil, by Peryassú, is undoubtedly based upon a misidentification. If the species had a wide distribution we would surely have received it from other localities and this has not been the case.

CULEX CORONATOR Dyar & Knab.

Culex cingulatus Theobald (not Fabricius, not Doleschall, not E. Blanchard), Mon. Culic., ii, 5, 1901.

Culex cingulatus Giles (not Fabricius, not Doleschall, not E. Blanchard), Gnats or Mosq., 2 ed., 406, 1902.

Culex cingulatus Theobald (not Fabricius, not Doleschall, not E. Blanchard), Mon. Culic., iii, 185, 1903.

Culex cingulatus Bourroul (not Fabricius, not Doleschall, not E. Blanchard), Mosq. do Brasil, 73, 1904.

Culex cingulatus R. Blanchard (not Fabricius, not Doleschall, not E. Blanchard), Les Moust., 301, 1905.

Culex coronator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 215, 1906.

Culex coronator Busck, Smiths. Misc. Colls., quart. iss., iii, 67, 1908.

Culex cingulatus Peryassú (not Fabricius, not Doleschall, not E. Blanchard), Os Culicid. do Brazil, 200, 1908.

Culex cingulatus Theobald (not Fabricius, not Doleschall, not E. Blanchard), Mon. Culic., v, 351, 1910.

Culex cingulatus Lutz (not Fabricius, not Doleschall, not E. Blanchard), Mem. Inst. Osw. Cruz, iv, 78, 1912.

ORIGINAL DESCRIPTION OF CULEX CORONATOR:

Antennæ with the tuft slightly beyond the middle, pale; head hairs, the upper in four or five, the lower in three or four, rarely five; body hairy. Air tube long, 9 × 1, the pecten reaching two-fifths, a crown of coarse spikes before apex, usually well developed, sometimes nearly obsolete. Anal gills moderate.

An abundant species throughout the tropics, apparently absent from the islands. Mr. Busck took it in a pool in the woods at St. Joseph, Trinidad, in a lagoon pool on the south side of Trinidad, in a bucket with live crabs and an open ditch in the middle of the village, Cedros, Trinidad. The junior author found this the commonest species in Mexico and Central America. The localities are: puddles in street, shallow

Digitized by Google

puddle on outskirt, pools in a stream, Cordoba; muddy roadway along railroad tracks, Tehuantepec; puddles, etc., Salina Cruz; tanks at Acapulco, Mexico; puddles, San Jose de Guatemala; ditch, San Salvador; hole in root of tree, Sonsonate, Salvador; shallow pool, Puntarenas, large muddy puddle and barrel of clear water, San Jose, Costa Rica; puddles in freshly dug railroad ditch, Port Limon, Costa Rica. This is a most inoffensive mosquito. Although breeding in myriads in all roadside puddles it seems not to bite and does not enter houses. The adults were all named "*Culex secutor* Theob." by Mr. Coquillett, except one of Mr. Busck's, which was called "*pipiens*" (it may have been in bad condition). To the junior author's specimens he added a query and the note "also *janitor*? and *tarsalis*?"

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender.. 5
5. Air tube four times as long as wide or over..... 7
7. Anal appendages four, normal..... 8
8. Air-tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent. 18
18. Air tube with a subapical crown of spikes; body pilose..... *coronator*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX CORONATOR:

Female.—Proboscis rather long, subcylindrical, uniform, labellæ conically tapered, pale; brownish black, darker at tip, a long white stripe on under side near middle; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, slender, black, with a few outstanding setæ. Antennæ with the joints subequal, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, luteous, black on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, prominent, brown, nude. Eyes bronzy black. Occiput blackish, clothed with narrow, curved pale-brown and brassy scales on vertex, becoming whitish at lower parts of sides and along margins of eyes, many erect, forked scales behind, mostly pale, a few of the central ones black and forming a patch on each side; black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with small pale scales and black bristles. Mesonotum brown, with two dorsal impressed lines of the same color; vestiture of narrow, curved bronzy-brown scales, scales around margins and ante-scutellar space paler, yellowish; a pair of pale subdorsal spots on the disks, and rather numerous black bristles; scutellum trilobate, pale brown, clothed with narrow, curved, pale scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ greenish luteous, with small patches of elliptical white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncated posteriorly; dorsal vestiture brownish black, a distinct rather narrow white band at the base of each segment except the first and a row of pale hairs at apex, on the sides the bands widen into triangular spots; venter yellowish-white scaled.

Wings moderate, hyaline; stem of second marginal cell about one-fifth as long as its cell, that of second posterior much shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales brown, the outstanding ones long, broadly linear, denser apically. Halteres pale.

Legs moderate, femora white beneath nearly to tip; tibiæ brownish black, pale below, tarsi darker; knees, apices of tibiæ and a ring at tip and base of each tarsal joint, white, much narrower and mostly basal on fore and mid legs, on hind tarsi broader, and with the last joint white with black middle ring. Claw formula, 0.0–0.0.–0.0.

Length: Body about 4.5 mm.; wing 4.5 mm.

Male.—Proboscis straight, slightly thickened towards apex, black scaled, with a broad pale ring beyond middle. Palpi exceeding the proboscis by nearly the length of the last two joints; end of long joint and the last two joints with long, dense, black hairs, whitish ringed at bases of last two joints, a small white

Digitized by Google

ring at basal third of long joint and a broad one at apical third. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, broadly black ringed at insertions of hair-whorls; hairs long, dense, black outwardly, brown at base. Coloration similar to the female. Wings narrower than in female, the stems of the fork-cells a little longer, vestiture sparser. Abdomen elongate, depressed, parallel sided; dorsal white bands broader than in the female, those on sixth and seventh segments laterally expanded, eighth segment entirely whitish scaled; lateral ciliation long, fine, dense, pale yellow. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 17, fig. 126): Side-pieces over twice as long as wide, tips conically tapered; a large quadrate outer lobe at outer third, bearing a row of eight rods on its surface, those toward apex of side-piece progressively smaller. Clasp-filament rather stout, uniform, gradually tapering towards tip, bearing a small terminal claw and two minute setæ situated on inner face before the tip. Harpes divided, outer limb long and curved. Harpagones divided into several large lamellæ, with angular rounded corners.

Larva, Stage IV (plate 103, fig. 344).—Head rounded, broad, narrowed before eyes, a notch at insertion of antennæ, the front margin broadly arcuate. Antennæ large, basal two-thirds stout, with a large hair-tuft at end and coarsely spinulate, outer third more slender, bearing two long setæ just before tip, a long and a short apical seta, and a small digit. Eyes large, transverse. Both pairs of dorsal tufts and ante-antennal tuft multiple. Mental plate small, triangular, a central tooth and six on each side, even. Mandible quadrangular, short and rather square; two long filaments, a short filament, and a tuft of hairs in notch before tip, an outer row of cilia from a collar; a row of little tufts from prominences on the outer margin; dentition heavy, four teeth on a process, the first and third long; a spine before, a double tooth at base, a broad filament and seven feathered hairs within; process below long; slightly but obscurely cleft, with hair-tufts at tip and a transverse row of little hairs near base; no basal angle, the two groups of long basal hairs in line somewhat near together. Maxilla elongate conical, divided by a band-shaped suture; inner half with three rows of hairs, a row of long hairs at tip, continued along the suture; outer half with two filaments below the middle and a long spine on the outer side. Palpus very short with rather long digits, one of which exceeds the others. Thorax rather squarely rounded, wider than long; hairs rather long. Abdomen moderate, anterior segments shorter; lateral hairs of first two segments multiple, double on the third to sixth; skin minutely spicular-pilose. Tracheal tubes slender. Air-tube very long, about eight times as long as wide, slightly uniformly tapered, a ring of thick spines before the tip; pecten reaching to one-fourth; the single teeth broad and rather numerously branched; several small hair-tufts scattered between the end of the pecten and the subapical spines. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate-elliptical, fringed with spinules which are long at the tip. Anal segment as long as wide, ringed by the plate; dorsal tuft of two long and two short hairs on each side; a double lateral hair; ventral brush well developed, confined to the barred area. Anal gills moderate, longer than the segment, ensiform.

The larvæ live in all sorts of ground-puddles and occasionally in artificial receptacles. Mr. Busck got them in Trinidad in a pool in a wood and in muddy pools in a road; Mr. Urich got them in a small puddle in a drain, the water covered with green algæ; Mr. Busck got them in Panama from a stagnant, ill-smelling pool caused by dumping dirt, in a barrel near a dump, from a stream with *Anopheles,* from a temporary rain-water pool, in a pool in a shaded moun-

Digitized by Google

tain stream, in a rain-water tank used for drinking, in a cement trap containing sink-water, in a tin can, in an old barrel, in the bottom of an old boat, in an open fountain on a plaza, in an old sugar-boiler, and in dark, foul water in swamps along a railroad; Mr. Jennings found them in water in hoof-prints and a wagon-rut, in an old kettle, in the trunk of a large fallen tree, in a pool in a field, in a swamp back of a dump, from a rapidly running river, from a reservoir, in puddles in a road, from a stream supplying a reservoir, from a pool in a swampy common at the edge of a town, and from a brackish pool in rocks above high-tide level; Mr. Knab found them in large numbers in a puddle in a street, in puddles in a stream-bed, in an old tank about 2 feet square under a bridge, in a tub of dirty water on a back porch, in a ditch of slightly muddy water near town, in a ditch containing a small quantity of foul water among bones and rubbish, in a trench back of a store, in a large well in an open field, in a ditch near a swamp which had been oiled but the oil had been blown aside by wind, in a tank in a garden, in a very muddy roadway along railroad tracks, in a ditch of filthy water near salt-works but the water fresh, in a pool of stagnant water in thick woods, in a small grassy pool near a beach, in pools full of algæ with *Anopheles*, in masonry tanks near a stream used for washing and bathing, in swampy ground along railroad tracks that had been oiled but cattle tracks had disturbed the film of oil, in large puddles in a road caused by recent rains, in rock-pools in a stream-bed, in a ditch of filthy water with a slight current, in hole in the root of a large tree, in a shallow pool frequented by cattle, in a boat full of rain-water, in puddles in a freshly dug ditch, in a water-hole in a stream-bed associated with *Culex derivator, Uranotænia basalis, Anopheles argyritarsis, Anopheles pseudopunctipennis*, and an *Aëdes*, in a small ditch of muddy water associated with *Culex pinarocampa* and *Aëdes cuneatus*, in a pool in a stream-bed associated with *Culex pinarocampa* and *Anopheles argyritarsis*, and in a water-hole beside a raidroad track associated with *Culex pinarocampa, Lutzia bigotii*, and *Anopheles*.

From the above it appears that the larvæ do not generally frequent tree-holes, nor take readily to artificial receptacles. The eggs are laid in raft-like masses. Mr. Knab counted the eggs in three masses, obtaining respectively the numbers 153, 156, and 158. The rafts were from seven to nine rows wide and contained at the most 27 eggs in the longest central rows. The egg-masses were floating upon the surface of the water. The female appears to be inoffensive. Mr. Knab doubts whether they ever bite man, as he was never bitten by a specimen, although this is the commonest species of *Culex* in nearly all the places that he visited. They apparently have not the habit of entering houses and it is possible that they are active in feeding only at night and away from houses where they would seldom molest man. The species, therefore, can not be considered as a dangerous or troublesome one. Recently Dr. A. Lutz has published a statement confirmatory of Knab's opinion regarding the habits of the female, and stating that the mandibular setæ are absent in this species.

Throughout the mainland from Brazil to Mexico, Island of Trinidad, but not on any of the Antilles.

St. Joseph, Trinidad, June 12, 1905 (A. Busck); Cedros, Trinidad, June 21, 1905 (A. Busck); Trinidad (F. W. Urich); Tabernilla, Canal Zone, Panama, April 26, May 13, July 22, 1907 (A. Busck); December 15, 1908 (A. H. Jennings); Culebra, Canal Zone, Panama, May 7, 1907 (A. Busck); Las Cascadas, Canal Zone, Panama, June 1 and 12, 1907 (A. Busck); Alhajuela, Canal Zone, Panama, June 7, 1907 (A. Busck); Chagres River, Panama, June 7, 1907 (A. Busck); Pedro Miguel, Canal Zone, Panama, June 22 and 24, 1907 (A. Busck); La Boca, Canal Zone, Panama, July 4, 1907 (A. Busck); Taboga Island, Panama Bay, Panama, July 4, 1907 (A. Busck); Lion Hill, Canal Zone,

Digitized by Google

Panama, July 26, 1907 (A. Busck); Panama City, Panama; April 18, 1904 (J. W. Ross); Corozal, Canal Zone, Panama, November 30, 1907 (A. H. Jennings); Panama City, Panama, December 2 and 5, 1907 (A. H. Jennings); Pedro Miguel, Canal Zone, Panama, December 7, 1907 (A. H. Jennings); Ancon, Canal Zone, Panama, December 6, 1907 (A. H. Jennings); Miraflores, Canal Zone, Panama, December 10, 1907 (A. H. Jennings); Rio Grande, Canal Zone, Panama, December 14, 1907 (A. H. Jennings); Empire, Canal Zone, Panama, December 20, 1907, April 15, 1908 (A. H. Jennings); Paraiso, Canal Zone, Panama, February 25, 1908 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, April 18, 1908, February 14, 1909 (A. H. Jennings); Gatun, Canal Zone, Panama, July 20, 1908 (A. H. Jennings); Taboga Island, Panama Bay (A. H. Jennings); Port Limon, Costa Rica (R. L. Turner); Port Limon, Costa Rica, September 27, 1905 (F. Knab); Zent, Costa Rica, September 26, 1905 (F. Knab); San José, Costa Rica, September 21, 1905 (F. Knab); "Las Loras" near Puntarenas, Costa Rica, September 9, 1905 (F. Knab); Sonsonate, Salvador, August 18, 1905 (F. Knab); San Salvador, Salvador, August 14, 1905 (F. Knab); Bluefields, Nicaragua (W. F. Thornton); San José, Guatemala, August 6, 1905 (F. Knab); Salina Cruz, Mexico, July 14, 1905 (F. Knab); Tehuantepec, Mexico, July 3, 1905 (F. Knab); Rincon Antonio, Mexico, June 25, 1905 (F. Knab); Santa Lucrecia, Mexico, June 20, 1905 (F. Knab); Córdoba, Mexico, June 10, 1905, January 6, 26, March 4, 1908 (F. Knab); Peñuela, Mexico, April 22, 1908 (F. Knab); Acapulco, Mexico, July 30, 1905 (F. Knab); Acapulco, Mexico (A. Dugès); Monterey, Mexico (A. MacMeans). The species is also reported from Rio de Janeiro and Pará, Brazil (Theobald); States of Rio de Janeiro, São Paulo, Minas Geraes, Goyaz, Matto Grosso, Bahia, Pará, and Amazonas, Brazil (Peryassú).

Culex coronator apparently extends its range throughout Brazil, having been recorded by Theobald and others under the name *Culex cingulatus* Fabricius, mixed with other similar species. Peryassú figures a larva apparently of this species as that of *Culex cingulatus* (Os Culicideos do Brazil, fig. 43), and his description (*loc. cit.*, p. 200, 1908) agrees with adults of *Culex coronator;* but adults sent us by Dr. Lutz from São Paulo, Brazil, as *Culex cingulatus* represent a different although similar species. As to the correct identification of *Culex cingulatus* Fabricius, the type is in the Zoological Museum at Copenhagen. Wiedemann gives a careful redescription of it, stating it to be yellowish, with white rings at the bases of the tarsal joints, and about 6 mm. long. Dr. Böving has kindly examined the type at our request and informs us that the tarsal annulations are basal only. From this it is obvious that *Culex cingulatus* can have nothing to do with the species under consideration; recently Dr. Arthur Neiva has examined the type and identified it as a species which we are treating under the genus *Psorophora.* Theobald has recently expressed a belief that *Culex tibialis* Robineau-Desvoidy is referable here, but without giving a reason (Mon. Culic., v, 350, 1910). It is clear from the description that *Culex tibialis* is a *Psorophora,* in the restricted sense, and it already has been made a synonym of *Psorophora ciliata.*

CULEX DERIVATOR Dyar & Knab.

Culex derivator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 216, 1906.

ORIGINAL DESCRIPTION OF CULEX DERIVATOR:

Antennæ with the tuft well outward; upper head tuft double, very long, body hairy; tracheæ narrow; lateral hairs in twos after the second abdominal segment. Air tube very long, 11 × 1, pecten reaching one-third its length, the distal teeth detached; five short tufts on posterior margin. Lateral comb of the eighth segment large, of long spines.

Taken by the junior author in a puddle in a ravine at Cordoba, Mexico, but not bred.

Digitized by Google

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout	19
19.	Air tube with long, well-defined tufts	20
20.	Body spicular-pilose	21
21.	Five tufts on posterior margin of tube subequal in length, short; lateral abdominal hairs in twos on segments 3 to 5	22
22.	Air tube 11 × 1; upper head hair double; pecten of air tube moderate	*derivator*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX DERIVATOR:

Female.—Proboscis rather long and slender, slightly enlarged at tip, labellæ pale, conically tapered; vestiture black, with bronzy and blue reflection; setæ small, curved, black, those on labellæ more prominently outstanding. Palpi slender, over one-fourth as long as proboscis, blackish scaled. Antennæ moderate, the joints subequal, rugose, pilose, black, hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, brownish luteous, darker on inner side. Clypeus rounded triangular, blackish, nude. Eyes black. Occiput blackish, clothed with narrow, curved pale-yellowish scales on vertex, flat whitish ones on lower part of sides; margin of eyes silvery white; numerous erect, forked, black scales on nape.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with pale scales and dark bristles. Mesonotum brown, with two narrow, impressed, bare lines; vestiture of narrow, curved golden-brown scales, anterior and lateral margins and region around ante-scutellar space with paler yellowish scales, a line on each side of ante-scutellar space extending to middle; bristles stiff, brown. Scutellum trilobate, clothed with pale shining scales, each lobe with a tuft of dark-brown bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ pale green, with patches of elliptical, flat whitish scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of black scales without metallic luster, a row of lateral triangular apical segmental white spots; venter greenish, vestiture of dull-white scales, last segment dark at base; tips of segments with rather coarse brown hairs.

Wings rather narrow, hyaline; petiole of second marginal cell over half as long as its cell, that of second posterior cell about equal to its cell; basal cross-vein distant slightly more than its own length from anterior cross-vein; scales of veins long, dense, linear, brown, with a blue reflection on costa, densest on forks of second vein.

Legs moderate, femora whitish beneath, except at tip; knees silvery white; tibiæ and tarsi black, with a bronzy and blue reflection. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

Male.—Proboscis moderate, gradually swollen towards apex, black scaled. Palpi exceeding proboscis by more than length of last joint, end of long joint and the last two joints slightly enlarged and bearing long, dense, black hairs; vestiture entirely bronzy black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls; hairs of whorls long, dense, black, not very closely placed. Coloration similar to the female. Wings narrower, the stems of the fork-cells slightly longer, vestiture a little less abundant. Abdomen elongate, depressed, second and third segments without bands, fourth to seventh with very narrow apical white bands, eighth with a broader apical band; lateral ciliation abun-

Digitized by Google

dant, rather coarse and short, blackish, tip of abdomen very hairy. Claw formula, 1.1–1.1–0.0.

Length: Body about 5.5 mm.; wing 4 mm.

Genitalia (plate 13, fig. 93): Side-pieces over twice as long as wide, tips conically tapered; inner lobe near the middle, quadrate, bearing two stout filaments with rounded tips and four setæ, the setæ arising from a slightly higher part of the lobe; clasp-filament moderate, slightly enlarged at base, bearing a terminal claw. Harpes divided, inner limb produced into a spatulate tip fringed with teeth, outer limb forming a rounded angle at the base. Harpagones elongate, broad, with rounded tips bearing small denticles. Basal lobes small, nearly spherical, bearing a few small hairs.

Larva, Stage IV (plate 110, fig. 370).—Head rounded, widest through eyes, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, slightly curved, thick and spined on basal two-thirds, with a large tuft from a notch, apical third slender; two long subapical setæ, a long seta, a short one, and a digit at tip. Both pairs of dorsal head-hairs double, ante-antennal tuft multiple. Mental plate triangular, straight on sides; a large central tooth and eight on each side, basal ones larger and more remote, last one small. Mandible quadrangular; two long filaments, a short one and a tuft of hairs at tip; an outer row of cilia from a collar; a row of little rounded transverse prominences within outer margin, bearing hair-tufts; dentition of four teeth on a process, the first the longest; a spine before, a triangular tooth and a large trifid one at base, a long, smooth, articulated filament and a long row of feathered hairs within; process below long, curved, obscurely furcate, with a transverse and a longitudinal row of hairs and a tuft at tip of each limb; basal angle rather large, the row of long hairs within with slightly enlarged dentate bases; a dense row of long hairs at base. Maxilla elongate, conical at tip, divided by a suture; inner half with a row of long spines on the margin, the basal ones feathered; two rows of cilia; outer half with two filaments below middle, a row of long hairs at tip running down next to the suture well toward base and a spine on the other side. Palpus small, with four irregular terminal digits, one which is rather long. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter; skin pilose; tracheæ narrow; lateral hairs multiple on first abdominal segment, triple on second, double on third to sixth. Air-tube long, straight, only slightly tapered, eleven times as long as wide; pecten running to one-fifth, outer teeth rather sparsely spaced; single teeth flat and broad, with a long basal branch and three or four subapical ones; a row of five little tufts along posterior margin. Lateral comb of eighth segment of many spines in a large triangular patch; single spine elongate, widened at tip, fringed with spinules. Anal segment a little longer than wide, ringed by the plate; dorsal tuft a group of long hairs on each side; a single lateral hair; ventral brush well developed, confined to the barred area. Anal gills twice as long as the segment, evenly tapered.

The larvæ live in pools in rocky stream-beds. Mr. Knab obtained them in water-holes in a stream-bed, the water clear and in some cases the stream overhung by high banks, so that the light was dim. In one case the water was milky from soap-suds used in washing. The larvæ were difficult to rear, Mr. Knab having failed to get any adults on his first visit to the locality, and only succeeded on his second visit, three years later. The adults probably do not bite.

Mexico.

Córdoba, larvæ in a water-hole in the bed of a small stream with perpendicular walls, June 13, 1905, associated with *Anopheles strigimacula* and *Anopheles eiseni* (F. Knab); Córdoba, larvæ in a water-hole of some size in a stream-bed, January 6, 1908, associated with *Anopheles pseudopunctipennis, Anopheles*

Digitized by Google

argyritarsis, Culex coronator, Uranotænia basalis, and an *Aëdes* (F. Knab); Córdoba, larvæ in a pool of clear water in a river-bed in a deep ravine, January 20, 1908, associated with *Anopheles strigimacula* and *Culex pinarocampa* (F. Knab); Córdoba, larvæ in a water-hole containing clear water, April 5, 1908, associated with *Anopheles argyritarsis* and *Culex pinarocampa* (F. Knab).

Culex derivator is allied to *Culex territans,* but in the female the dorsal abdominal bands are wanting. The lateral spots are posteriorly situated, as in *Culex territans.*

CULEX TERRITANS Walker.

Culex territans Walker, Ins. Saund., Dipt., i, 428, 1856.
Culex territans Giles, Gnats or Mosq., 198, 307, 1900.
Culex territans Theobald, Mon. Culic., ii, 111, 1901.
Culex territans Dyar, Journ. N. Y. Ent. Soc., ix, 178, 1901.
Culex territans Giles, Gnats or Mosq., 2 ed., 455, 1902.
Culex territans Smith, Ent. News, xiii, 302, 1902.
Culex territans Dyar, Science, n. s., xvi, 672, 1902.
Culex territans Johannsen, N. Y. State Mus., Bull. 68, 416, 1903.
Culex territans Dyar, Proc. Ent. Soc. Wash., v, 48, 142; pl. ii, fig. 18, 1903.
Culex apicalis Adams (not Theobald), Kans. Univ. Sci. Bull., ii (2), 26, 1903.
Culex territans Dyar, Proc. Ent. Soc. Wash., vi, 40, 1904.
Culex territans Smith, Bull. 171, N. J. Agr. Exp. Sta., 24, 1904.
Culex territans Felt, Bull. 79, N. Y. State Mus., 307, 1904.
Culex territans Knab, Journ. N. Y. Ent. Soc., xii, 176, 246, 1904.
Neoculex territans Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex territans Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 325, 1905.
Culex territans Felt, Bull. 97, N. Y. State Mus., 445, 483, 1905.
Culex territans Blanchard, Les Moustiques, 367, 1905.
Culex saxatilis Grossbeck, Can. Ent., xxxvii, 360, 1905.
Culex territans Britton & Viereck, Rept. Conn. Agr. Exp. Sta. for 1904, 271, 273, 1905.
Culex territans Quayle, Univ. Cal. Agr. Exp. Stat., Bull. 178, 52, 1906.
Culex territans Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 217, 1906.
Culex territans Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 23, 1906.
Culex territans Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Culex territans Weber, Ent. News, xvii, 282, 1906.
Culex territans and *Culex saxatilis* Smith, Rept. N. J. Agr. Coll. Exp. Stat. for 1905, 685, 1906.
Culex frickii Ludlow, Can. Ent., xxxviii, 132, 1906.
Culex territans Theobald, Mon. Culic., iv, 448, 1907.
Culex apicalis Theobald (not Theobald), Mon. Culic., iv, 452, 1907.
Culex territans Dyar, Proc. U. S. Nat. Mus. xxxii, 125, 1907.
Culex territans Howard, Osler's Modern Medicine, i, 377, 1907.
Culex territans Viereck, 1st Ann. Rept. Comm. Health, Pa., 471, 1908.
Culex territans Thibault, Proc. Ent. Soc. Wash., xii, 21, 1910.
Culex territans Theobald, Mon. Culic., v, 359, 1910.
Culex apicalis Theobald (not Theobald), Mon. Culic., v, 362, 1910.
Culex frickii Theobald, Mon Culic., v, 371, 1910.
Culex saxatilis Theobald, Mon. Culic., v, 612, 1910.
Culex territans Morse, Ann. Rept. N. J. State Mus., 1909, 720, 1910.
Culex saxatilis Morse, Ann. Rept. N. J. State Mus., 1909, 721, 1910.

ORIGINAL DESCRIPTION OF CULEX TERRITANS:

Pallide fusca; proboscis tectacea, apice fuscescens; antennae basi fuscae; thorax testaceo trivittatus; abdomen fasciis albidis, subtus testaceum; pedes testacei; alae subcinereae, venis fuscis subciliatis; halteres testacei.

Pale brown. Proboscis testaceous, slender, brownish at the tip. Antennæ brown, testaceous at the base, as long as the proboscis. Thorax with three very slender testaceous stripes. Abdomen testaceous beneath; dorsal segments with whitish hind borders. Legs testaceous, long, and slender. Wings grayish; veins brown, slightly ciliated. Halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

United States.

ORIGINAL DESCRIPTION OF CULEX APICALIS:

Female: Head brown; scales mostly light yellow, some long brown ones; palpi and proboscis wholly brown, antennæ brown, with base lighter, thorax brown with light brown scales, pile black; abdomen dark brown, covered with brownish scales, except those on the posterior margin, which are white, forming on the second and

Digitized by Google

third segments small triangles by projecting forward in the middle, and on the following segments forming narrow bands, venter covered largely with white scales; coxæ and base of femora pale yellow, rest of legs and tarsi wholly brown, tarsal claws small and simple; veins of wings sparsely covered with hairs and scales, petiole of first submarginal cell one-half the length of that cell, the cross-veins at ends of first and second basal cells distant from each other. Length 4 1/3 mm.

Two specimens; Arizona. Prof. F. H. Snow.

ORIGINAL DESCRIPTION OF CULEX SAXATILIS:

♀.—Head brown, occiput covered with yellowish white scales and some dark brown ones; antennæ and proboscis dark brown, the former with scattered whitish scales; palpi brown, apparently three jointed, the fourth being minute, pointed and wholly retracted within the third joint. Mesonotum clothed with rich brown scales and pale yellowish ones at the margins; two naked lines extend down the anterior part and two pale yellowish spots are on the centre of the dorsum which become more or less diffused posteriorly; scutellum brown with yellowish scales and long black bristles on the posterior margin; metanotum grayish brown; pleura light brown with small patches of dirty white scales; halteres yellowish. Abdomen dark brown, all segments with apical white bands which become broad laterally, till, beneath, it is white with dark brown basal corners. Legs black, coxæ, base and under side of femora and a small spot at the knee creamy; claws simple; wings hyaline, the scales brown, petiole of first sub-marginal cell about one-third the length of this cell. Length 4.7–5 mm.

Types, six females in the New Jersey Experiment Station collection. Distinguished from *Culex territans*, its nearest American ally, by its large size, dark colour, broadly banded abdomen and spotted thorax.

Pupæ of *Culex saxatilis* were found August 31st on Garret Mountain (Paterson), in a rock-bottomed pool, associated with larvæ and pupæ of *C. pipiens*. In the afternoon of the same day two females emerged together with several *pipiens*. Sept. 1st, 5 others, all females, hatched with more *pipiens*. Later emergences were all *pipiens*. As in the preceding species the last of the brood was collected in the pupal stage; no larvæ remaining.

ORIGINAL DESCRIPTION OF CULEX FRICKII:

Female: Head covered with pale ochraceous, almost white scales, long curved ones, heavily intermingled with dark brown forked scales on the occiput and vertex, flat lateral scales, light around the eyes, with a few dark bristles projecting forward; antennæ brown, verticels and pubescence brown, first joint with a few light scales, basal joint covered with "frost" and a few white scales; palpi dark brown, distal joint small; proboscis brown; clypeus brown, with "frost;" eyes dark brown.

Thorax brown; prothoracic lobes covered with pale ochraceous scales and dark brown bristles; mesonotum with narrow curved dark brown scales, a golden-brown in some lights, a few pale ochraceous ones hardly forming a line on the lateral margins and an arch of them surrounding the "bare space," two submedian bare lines from cephalic end nearly to "bare space" covered with "frost," so that they seem like two very fine but distinct white lines; scutellum brown, with pale ochraceous curved scales and large brown bristles; pleura covered with white "frost" and having a couple of large bunches of white, flat spatulate scales; metanotum brown.

Abdomen brown, covered with rather broad flat scales, tending to iridescence, narrow white apical bands, and white apical lateral spots continuous with the scaling of the venter, which is white; white apical hairs. On the last segment the apical band becomes much diminished on the median line, possibly sometimes broken so as to form two spots.

Legs as a whole brown; coxæ and trochanters light and nearly naked, but showing the white "frost;" femora light at base and on ventral aspect, a small light knee-spot minutely involving both sides of the joint; tibia brown, a minute apical light spot involving both sides of the joint, remainder of tarsi all brown; all ungues small, equal, and simple.

The colouring as a whole is dark, but the scales are very sensitive to the position of the light, and on the legs it is almost impossible to determine if there be a very narrow light line on the ventral aspect of the tibia or not, for in some lights it is not apparent, and in others it appears present. The mesothorax shows the same trait, in that the tips of the scales become golden-brown, and are thus very misleading.

Wings clear; scales brown, slender, covering the distal half of wing rather heavily; cells vary somewhat in the two wings, first submarginal about a third longer and nearly the same width as second posterior, the stem of the former about a fourth the length of its cell, of the latter a little more than half the cell's length; supernumerary and mid about the same length and meet, posterior cross-vein slightly

Digitized by Google

shorter and three times its length distant. Halteres light, a few brown scales on the distal parts of stem.

Length, 4 mm. Habitat, Fort Snelling, Minn. Taken Oct. 1.

Collected and sent by Major E. B. Frick, Surg. U. S. Army, after whom it is named.

It lies very near *territans*, but differs in general colouring, in the "frosty" submedian lines on the mesonotum, the light scales around the "bare space," light scales on the scutellum, the much better developed apical abdominal bands, white bases and venter of femora, and the minute spot at apex of tibia.

DESCRIPTION OF FEMALE, MALE, LARVA, AND PUPA OF CULEX TERRITANS:

Female.—Proboscis moderate, subcylindrical, labellæ conically tapered; vestiture of brownish-black scales. Palpi short, one-fifth as long as proboscis, slender, black, with a few outstanding setæ. Antennæ with joints subequal, rugose, pilose, black, second joint pale at base; tori subspherical, with a cup-shaped apical excavation, luteous, black within; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, blackish brown, nude. Occiput brown, clothed with narrow, curved, yellowish white scales, more whitish along margins of eyes and lower parts of sides, a black spot on each side, many erect, forked pale-brown scales on nape; a row of bristles along the ocular margins.

Prothoracic lobes elliptical, remote dorsally, with whitish vestiture and brown bristles. Mesonotum dark brown, with two narrow, impressed, darker lines; vestiture of narrow, curved pale-brown scales and rows of dark setæ, a lighter area about the ante-scutellar space and around the margins, a pair of yellowish subdorsal spots on disk. Scutellum trilobate, brown, clothed with narrow, minute curved, pale scales, each lobe with a tuft of brown bristles. Postnotum with a dorsal carina, elliptical, prominent, luteous, nude. Pleuræ and coxæ brownish, with patches of elliptical, flat white scales and rows of pale bristles.

Abdomen subcylindrical, truncated at tip; dorsal vestiture black, with a faint bluish reflection, a moderately broad soiled white band at apex of each segment except the first, widening on sides; venter whitish scaled, a dark membrane showing at incisions.

Wings ample, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales brownish black, the outstanding ones long, dense, and broadly linear. Halteres whitish, with darker knobs.

Legs moderate; tibiæ white at base and beneath nearly to tips; vestiture otherwise black, with a blue reflection above and a brassy one beneath; knees narrowly whitish; base of first tarsal joint narrowly whitish. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 4 mm.

Male.—Proboscis straight, slightly enlarged at apex. Palpi exceeding proboscis by nearly the length of the last two joints, which are slightly thickened and, with end of long joint, bear many long black hairs; vestiture brownish, bases of last two joints pale. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, broadly ringed with black at insertions of hair-whorls; hairs long, brown. Coloration similar to the female. Wings narrower than in female, the stems of the fork-cells longer, vestiture sparser. Abdomen long, subcylindrical and slender on basal half, depressed and broadened apically; lateral ciliation long and dense, rather coarse, pale brown. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 13, fig. 94): Side-pieces more than twice as long as wide, tapered outwardly; marginal appendages on a slight subapical prominence from which a serrated membrane runs to tip; appendages consisting of two capitate

Digitized by Google

rods, two serrated setæ, and three pointed setæ. Clasp-filament large, slender, with an articulated terminal claw. Harpes stout, columnar, with serrated tips. Harpagones columnar, exceeding the harpes in length, with an inner slender branch projecting at right angles, apex tapered, bearing a row of hairs. Basal appendages short, approximate, setose.

Larva, Stage IV (see figure of the entire larva, plate 50).—Head large, subquadrate, broad, wider than long, sides straight, a broad notch at insertion of antennæ, front margin broadly arcuate. Eyes large. Antennæ long, basal two-thirds thickened, finely spined, a large tuft at outer third, part beyond slender; two very long hairs before the tip, a long hair, a short one, and a digit at apex. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Mental plate quadrate, the sides oblique; apical tooth large, five equal teeth on each side, followed by two very small ones on sides. Mandible quadrangular, elongate, two filaments before the tip, with four small hairs arising from their bases; an outer row of cilia from a collar; a few very small hairs on outer margin; dentition of four teeth on a process, the first very large; a long spine-shaped tooth before, an irregular group of three at base, a very long serrate filament and row of feathered hairs within; process below rounded, with a slight notch on inner side and a few scattered hairs; angle below sharp and narrow; four long scattered hairs within and a row at base. Maxilla elongate, narrow, divided by a suture; inner half with coarse hairs inwardly, with some fine hair near the suture; a row of long hairs at apex running along the suture; outer half with some fine hairs next the suture; filaments small and basally placed; spine on other side near apex, long. Palpus small, rather slender, with five slender apical digits. Thorax rounded, wider than long; hairs abundant, very long, anterior thoracic ones nearly twice the length of the head. Anterior abdominal segments short, posterior ones elongated; lateral tufts of the first two segments multiple, those of third to sixth double; secondary hairs rather well developed; tracheal tubes narrow, linear, somewhat separated in the seventh segment. Air-tube long, somewhat conical on basal third, tapered, but expanding again at apex, about seven times as long as wide; pecten on basal third, of evenly spaced teeth; separate teeth slender, with two basal branches; four small tufts along posterior margin beyond pecten. Lateral comb of eighth segment a patch of scales several rows deep; single scale with expanded apex, finely fringed all around. Anal segment nearly twice as long as broad, ringed by the plate; a dorsal hair and sparse but long tuft on either side, a single lateral hair; ventral brush moderate, confined by the plate. Anal gills longer than the segment, with rounded ends.

Pupa (plate 148, fig. 698).—Thoracic mass subpyriform; small tufts on the head and prothorax; air-tubes long, slender, scarcely expanded; abdomen stout, the lateral hairs very slight, only forming a sparse tuft on the eighth segment.

Eggs (plate 147, fig. 688).—Subcylindrical, slightly tapered toward upper end, black, arranged upright in the form of a raft, in the manner typical of *Culex*.

The larvæ frequent especially marshes and edges of ponds, where protected by vegetation. The females hibernate. The larvæ appear at first in small numbers, but late in the season become abundant in all stagnant or vegetation-filled water throughout temperate North America. The adults apparently do not bite man, and nothing is known of their habits. Mr. Knab has published the following observations on the egg-laying habits:

"During the summer of 1903, in examining rain-barrels for mosquito material, egg-clusters were several times found upon the sides of the barrel some distance above the surface of the water. At first it was thought that these egg-boats had come into that situation by some disturbance of the water, but later a number of them were found in the same barrel and at different heights from

Digitized by Google

the water—some of them six or eight inches above the water-level. It was also noticed that the longitudinal axis of the cluster was always vertical and there could be no doubt that the eggs were deposited in that situation. These egg-boats were easily detached and when placed in water floated in the ordinary manner of the eggs of *Culex pipiens* and *Culex restuans* and the eggs hatched within a day. The larvæ from these eggs proved to be those of *Culex territans,* which was also the most abundant form in the barrel in question. It may be added that this rain-barrel stood in a large and well-shaded picnic grove and nearby were several small ponds fed by springs where the larvæ of *Culex territans,* and of that species only, were abundant. Upon a previous occasion four egg-boats of *Culex territans* were found at the margin of one of these little ponds. They were under a projecting tussock, attached to its base just above the surface of the water. Doubtless the eggs find their way to the surface of the water by some mechanical means and most likely are washed down by a heavy dew or a rain. Probably they do not hatch until they reach the water.

"Upon August 16, 1904, it was my good fortune to come upon a mosquito of this species in the act of ovipositing. In the above mentioned grove was a discarded dish-pan partly filled with rain-water and upon its steep side the mosquito was depositing its egg-cluster. About half the eggs were already laid. The mosquito sat face upward, the tips of her hind legs just touching the edge of the water. Her legs were placed well apart in the ordinary resting attitude, her abdomen turned abruptly downward. A very slight backward and forward motion of the abdomen could be discerned as the eggs were extruded in rather quick and regular succession. The last half of the cluster was laid in about eighteen minutes—from 10.45 to 11.03 in the forenoon. The manner in which the eggs are extruded and placed against the preceding ones is remarkable.

"Although the abdomen is bent almost straight downward, the mouth of the ovipositor is turned dorsally and upward so that the egg, which appears with the tapering end foremost, is pushed upward along the dorsal side of the abdomen until nearly the entire egg is exposed. A slight backward motion of the abdomen then pushes the egg against the cluster, the basal part of the egg being first brought in contact. When oviposition was completed the mosquito walked slowly up the side of the pan and was then captured.

"The completed egg-cluster contained 132 eggs laid in eight very regular rows, with the slightly curved eggs all turned in the same direction. Only at one end of the cluster, that towards which the eggs are curved, and its beginning, I judge, the regularity of the arrangement is broken. The number of eggs in each row was as follows: 11, 16, 18, 19, 19, 19, 18, 12. The egg is cylindrical, about four times as long as broad. The lower end is spherically rounded; the upper third tapers very gradually, is slightly curved, and ends in a blunt point. The color, by direct light, is brownish gray, darkening at the tip. The surface of the egg appears smooth, but under a high power is seen to be very finely and rather closely granulate. Along the sides are traces of the secretion by which the eggs were fastened together. The eggs adhere together quite firmly and it is only by some little force that one of them can be detached. As a result of the slight taper and curvature of the eggs towards the top the cluster is slightly convex at the bottom. Before hatching the eyes of the larva show through as two dark red spots about one-fourth above the base of the egg, and the segments of the larva may be also faintly discerned. The eggs when first laid are pure white, shining, and darken very slowly. When examined three-fourths of an hour later (11.50) they were still white and an hour after this (12.50) they were just tinged with blue gray. Two hours later (2.50) they were of a gray such as that of the freshly broken surface of cast iron, and at 4.20 they were a dark iron-gray and had not yet attained their full coloring.

Digitized by Google

"Upon the same day at 1.25 p. m., a second mosquito was found ovipositing close by the first egg-cluster. Over one-third of the eggs were already laid. The attitude and behavior of this mosquito were much like those of the other one. The hind legs, however, were placed closely along the sides of the egg-cluster, while in the other mosquito they had been well apart. It is quite possible that the hind legs are crossed in the beginning to receive the first few eggs, as Réaumur has observed in *Culex pipiens*. The second mosquito concluded her egg-laying in 15 minutes and flew suddenly away. The egg-cluster was more elongate and straight-sided than the first one and contained 105 eggs in six rows. The number of eggs in the rows was: 6, 21, 21, 21, 20, 16.

"The day upon which these observations were made was warm and partly cloudy.

"My experience in western Massachusetts has been that, aside from the species frequenting rain-barrels, *Culex territans* is the only species of *Culex* breeding continuously and in numbers throughout the summer. It frequents pools in the woods with clear, cool water and ditches with a slight current. I have also found a few of the larvæ in a clear mountain spring. The attitude of the larva when at the surface is very characteristic and enables one at once to distinguish it from closely related forms. The breathing tube is vertical, while the body is horizontal in position. In all other forms that I have seen the body inclines downward at a greater or less angle.

"The eggs of *Culex territans* have been noted by Dr. Dyar (Science, n. s., xvi, 672, 1902) who says 'they are laid in little groups of two or three side by side.' It is obvious, however, that he observed only the parts of a cluster that had become broken apart after hatching."

Dr. John B. Smith, in his report on the mosquitoes of New Jersey (1905), discusses the habits of *Culex territans* as follows:

"Little is known of the habits of this species, though it is by no means uncommon. It is not certain even that it bites, although until recently I have believed that it did. * * *

"It is not definitely known how the insect hibernates, though the indication is that it does so in the egg-stage. It is certain that none of the collections of hibernating adults thus far made has produced even a single example of this species. *Territans* is not uncommon at Lahaway, yet in Mr. Brakeley's thorough collections in the cellars and outbuildings there it did not occur once. It is also quite common at Bordentown; yet among the hundreds of mosquitoes taken there in cellars and empty houses by Mr. Brakeley not an example of this form was found. In fact, none of my collectors ever found any specimens in winter.

"Among the house collections *territans* occurs rarely, and Mr. Brakeley reports only one specimen, July 26, 1903, in the dining-room at Lahaway. Practically no specimens were in the extensive series of collections made for me by Mr. Buchholz at Elizabeth in 1902 and 1903. In reality, there were 13 examples out of 318 that seemed referable to this species in the 1902 collection. The collections made in 1903 show an even smaller percentage in a much greater number of examples, all taken late in the season. There is some doubt also about the egg-laying habits of the insect, but it seems certain that it makes small boats which probably disintegrate rapidly, allowing the individual eggs to sink to the bottom.

"*Territans* is not a traveler, and seems very local, even where it occurs in considerable numbers.

"This is one of the few mosquito larva that is really recognizable at a glance; the large, square head and the very long and very slender anal siphon forming a combination that can not be mistaken. This is, essentially, a clean water wriggler, though it is occasionally found in stagnant water. Mr. Brakeley and

Digitized by Google

Mr. Grossbeck both report it from rain barrels, each once only. It has occurred in my pails once only so far as our records go. Mr. Brakeley has a pool with cattails where specimens can usually be found until November, and I have taken it myself at the extreme edge of one of the fish ponds at Lahaway. The margin here was very shallow, the pine chats from the edge extending under water to some distance, and here specimens could be found in small numbers. Among the grass in a lily pond, also inhabited by fish, examples are also to be found at almost all times. In fact the grassy edge of large ponds is a favorite place for this species, which seems to escape fish better than most other wrigglers. Another favorite breeding place is in the quiet eddies or side pools of even rapid streams, where it is usually the only species found. It is frequent in springs and is almost universal in swamp pools formed of spring water. It gets down to the edges of the salt marsh at times and is found in company with *salinarius* in the more permanent pools at the edge of the highland. In fact, this is essentially an inhabitant of permanent water bodies and in swamps is the frequent companion of *Anopheles*. But it may be and is also found in pools which dry out completely at times, and even in rain pools and woodland depressions. It is not a universal breeder, however, like *pipiens*, and never occurs in such masses; the larvæ are individual in occurrence rather than in swarms."

Dr. Smith's opinion that *Culex territans* hibernates in the egg-state seems ill-founded and at variance with what is known of the other mosquitoes which lay their eggs in a mass or raft. The larvæ appear later than those of any of the forms known to hibernate as eggs and undoubtedly come from eggs deposited in the spring by hibernated females. Knab has taken hibernated females in March, in the vicinity of Washington. These were among the crevices of stones overhanging a spring in the woods and had undoubtedly passed the winter there. It would seem from Dr. Smith's observations that this species does not seek the shelter of buildings for hibernation and on this account its mode of passing the winter had not been determined.

Temperate to subtropical North America.

Lincolnville, Maine, August, 1908 (H. G. Dyar); Center Harbor, New Hampshire, July 16, 1902 (H. G. Dyar); Montgomery, Massachusetts, September 6 and 11, 1903 (F. Knab); Wilbraham, Massachusetts, September 1, 1903 (F. Knab); Westfield, Massachusetts, August 25, 1903 (F. Knab); West Springfield, Massachusetts, May 22, June 5, July and August, 1903 (F. Knab); Springfield, Massachusetts (G. Dimmock); Granby, Massachusetts, September 15, 1903 (F. Knab); Chicopee, Massachusetts, September 11, 1903 (F. Knab); Bellport, New York, August (H. G. Dyar); Lahaway, New Jersey, August (J. T. Brakeley); Norristown, Pennsylvania, July 18 (H. L. Viereck); Brown's Bridge, Pittsburg, Pennsylvania, August 8 (H. L. Viereck); Pittsburg, Pennsylvania, July 1, 1906 (H. L. Viereck); Glen Worth, near Pottsville, Pennsylvania, July 10 (H. L. Viereck); Reading, Pennsylvania, July 5 (H. L. Viereck); Devon, Pennsylvania, June 8, 1906 (H. L. Viereck); Fairmount Park, Philadelphia, Pennsylvania (H. L. Viereck); Sunbury, Pennsylvania (H. L. Viereck); Allentown, Pennsylvania (H. L. Viereck); Baltimore, Maryland, June 3, 1904 (Dyar & Caudell); Washington, District of Columbia, June, 1903 (F. C. Pratt); Weekapaug, Rhode Island, July 5, 1904 (H. G. Dyar); Falls Church, Virginia, May 6, 1903 (H. G. Dyar); Arlington, Virginia, September 25, 1903 (T. Pergande); Chain Bridge, Maryland, October, 1902 (A. N. Caudell); Cabin John, Maryland, March 27, 1910 (F. Knab); Moody, New York, August (H. G. Dyar); Loon Lake, New York, August 9, 1905 (H. G. Dyar); Magnolia Springs, Florida, March 3, 1905 (Dyar & Caudell); Jacksonville, Florida, March 4, 1905 (Dyar & Caudell); Miami, Florida, March 7, 1905 (Dyar & Caudell); Sanford, Florida, March 17, 1905 (Dyar & Caudell); West

Digitized by Google

Tampa, Florida, March 18, 1905 (Dyar & Caudell); Kissimmee, Florida, March 19, 1905 (H. G. Dyar); Baton Rouge, Louisiana (J. W. Dupree); St. Louis, Missouri, August, 1904 (A. Busck); Scott, Arkansas, October 3, 1908 (J. K. Thibault, Jr.); Urbana, Illinois, September, 1904 (F. Knab); Ames, Iowa, July 18, 1906 (H. J. Quayle); Las Vegas Hot Springs, New Mexico, August 11, (H. S. Barber); Kaslo, British Columbia, May 13, July 8, 1903 (H. G. Dyar); Stanford University, California (I. MacCracken); Arroyo Seco, Pasadena, California, May 11, 1906 (H. G. Dyar); Ostrich Farm, Pasadena, California, June 30, 1906 (H. G. Dyar); Sisson, California, 3500 feet altitude, July 23, 1906 (Dyar & Caudell); Wellington, British Columbia, August, 1906 (Dyar & Caudell); Garret Mountain, New Jersey, August 31 (J. A. Grossbeck); Hornerstown, New Jersey (J. T. Brakeley); Ithaca, New York, August (O. Johannsen); Coyoacan, Federal District, Mexico (A. L. Herrera). Recorded also from Arizona (Adams), Minnesota (Ludlow), and Connecticut (Britton & Viereck).

The widely ranging species *territans* varies somewhat in general color and considerably in the thoracic ornamentation and the width of the white abdominal bands, but does not divide into specific forms. The forms described by Adams, Grossbeck, and Ludlow appear to us to be variations only, and we accordingly quote them in the synonymy; we have bred all the extreme forms from identical larvæ and the male genitalia agree. We have before us cotypes of *Culex saxatilis* Grossbeck. There is a slight local alteration in the male genitalia of specimens from California and Mexico, indicating the beginnings of geographical races. In the specimens from California, the harpagones exceed the harpes considerably, while the tips of the lateral filaments of the side-pieces are narrowly appendiculate; in the Mexican specimens the harpagones are also long, but the filaments have rounded tips. In the Mexican form the basal appendages are united by a distinct chitinous band. We think these incipient local races scarcely worthy of differential names.

At our suggestion Mr. F. W. Edwards has examined Walker's type of *Culex territans* in the British Museum and informs us that it is identical with *Culex restuans* Theobald; therefore Coquillett's identification, which we use, is in error. The present species must, therefore, be called *Culex saxatilis*, while *C. restuans* will become a synonym of *Culex territans*. This information reached us too late to make the necessary changes in the present work.

CULEX BAHAMENSIS Dyar & Knab.

Culex bahamensis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 210, 1906.

ORIGINAL DESCRIPTION OF CULEX BAHAMENSIS:

This very peculiar species was collected by Dr. T. H. Coffin in the Bahamas, but, although he preserved pupæ, he obtained no adults. The skin is glabrous, but curiously enough, the air tube is pilose outwardly. The lateral hairs in threes on the third and fourth segments, in twos on the fifth and sixth. There are but a single pair of anal gills, a character only paralleled in *Wyeomia*. The six tufts of the air tube are arranged in a line along the posterior margin, three of them within the pecten.

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender. 5
5. Air tube four times as long as wide or over..... 7
7. Anal appendages only two..... *bahamensis*

DESCRIPTION OF LARVA OF CULEX BAHAMENSIS (ADULT UNKNOWN):

Larva, Stage IV (plate 107, fig. 359).—Head rounded, widest through eyes, narrowed before, a notch at insertion of antennæ, front margin arcuate. Antennæ large, stout on basal two-thirds, well spined; a large tuft from a notch at outer third; two long setæ some distance before tip, a long seta, a short one,

Digitized by Google

and a digit at tip. Head-hairs long, both pairs of dorsal tufts and ante-antennal tuft multiple. Mental plate elongate-triangular, with a stout central tooth and seven on each side, the last one remote but not much smaller. Mandible quadrangular; three filaments and a tuft of small hairs before tip; an outer row of cilia from a collar; a row of short rounded ridges on front margin, each with a little tuft of hairs; dentition of four teeth on a process, first and third longest; spined before, a tooth at base, a long serrate filament and five feathered hairs within; process below somewhat bent, obscurely furcate, with a longitudinal and a transverse row of hairs; basal angle small; a row of long hairs within and another row at base. Maxilla elongate, divided by a suture; inner half with a double row of spines on margin and two rows of rather stout cilia; a row of long hairs at tip, running down next the suture; outer half with the filaments a little below the middle, preceded by a small group of hairs. Palpus slender, with four rather long irregular apical digits. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter; lateral hairs multiple on first two segments, in threes on third and fourth, in twos on fifth and sixth; skin smooth. Air-tube long, five times as long as wide, tapering outwardly, but straight at tip, pilose apically; pecten reaching nearly half the length of tube, the last teeth detached; single tooth broad, with from one to three basal branches on one or both sides; six or seven large tufts along posterior margin, two within the pecten, the others beyond it. Lateral comb of eighth segment of many spines in a large triangular patch about five rows deep; single spine elongate, rounded, fringed with spinules. Anal segment about as long as wide, ringed by the plate; dorsal tuft a long hair and brush on each side; ventral brush well developed, confined to the barred area. Anal gills only two, short, thick and rounded, about half as long as the segment.

The life history and habits are unknown.

The larva shows considerable and unusual amount of variation in the number and arrangement of the pecten-teeth of the air-tube, and also in the arrangement of the tufts on its ventral surface; it is nevertheless readily recognized by the other characters, the spicular-pilose surface of the air-tube and the single pair of anal gills. We suspect from the reduction of the anal gills that the larvæ are inhabitants of salt or brackish water.

Bahama Islands, West Indies.

Most unfortunately no adults were obtained by the collector, Dr. T. H. Coffin, which can be authentically associated with these larvæ, nor is the exact locality known to us. Dr. Dyar did not meet with the larvæ on New Providence Island, though making a special search for them in February, 1915.

CULEX SPHINX, new species.

Culex territans Coffin (not Walker), in Shattuck, The Bahama Isls., 288, 1905.

DESCRIPTION OF FEMALE AND MALE OF CULEX SPHINX (LARVA UNKNOWN):

Female.—Proboscis moderate, subcylindrical, very slightly expanded at tip, labellæ conically tapered, pale; vestiture of dull-brown scales with a slight luster, somewhat paler beneath, particularly on basal portions. Palpi short, one-fifth as long as proboscis, slender, black, with a few outstanding setæ. Antennæ rather long, joints subequal, rugose, pilose, black, second joint pale at base; tori subspherical, with a cup-shaped apical excavation, luteous brown, darker on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, brownish, nude. Occiput blackish brown, clothed with narrow, curved pale-brownish scales, margin of eyes white, many erect, forked pale-yellowish scales on nape; a row of black bristles along ocular margins.

Prothoracic lobes elliptical, remote dorsally, with pale scales and brown bristles. Mesonotum pale brownish-gray, a brown patch over roots of wing, the

Digitized by Google

area including the impressed lines on anterior half of disk also dark brown; vestiture of pale golden-brown, narrow, curved scales, those around ante-scutellar space paler, creamy; several rows of coarse dark-brown setæ. Scutellum trilobate, brownish, clothed with dull-creamy scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, pale brown, nude. Pleuræ and coxæ luteous, with patches of white scales and rows of brown bristles.

Abdomen subcylindrical, truncate at tip, segments with rather coarse posterior setæ and numerous coarse hairs beneath; dorsal vestiture dull brownish-black, with a few whitish scales along posterior margins of segments, dull-white scales at sides forming a straight lateral line above lateral edges of dorsal sclerites; venter entirely dull-white scaled.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales dark brown, with a bluish reflection on costa, the outstanding ones narrowly ligulate, denser on forks of second and fourth veins and outer half of third vein. Halteres whitish, with darker knobs.

Legs moderate; femora pale beneath, remaining vestiture dull brown, with a slight bronzy luster, paler beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3.5 mm.

Male.—Proboscis straight, longer than in the female, slightly swollen apically, dark scaled, tip and labellæ pale beneath. Palpi slightly longer than proboscis, slender, slightly thickened on last two joints, tip of long joint and the last two joints with many rather short hairs; vestiture black, with a slight bronzy luster. Antennæ rather short, plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, ringed with black at the insertions of the hair-whorls; hairs long, brown, with a silky luster. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, basal cross-vein more than twice its length from anterior cross-vein. Abdomen elongate, depressed, somewhat broadened apically, with rather long, brownish lateral ciliation. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Genitalia (plate 18, fig. 134): Side-pieces over twice as long as wide, tips conically tapered, lateral prominence low, quadrate, bearing 3 stout rods with hooked tips, two setæ, a somewhat expanded appendage and a coarse seta. Clasp-filament long and slender, with a stout terminal claw. Inner limb of harpes bearing a tuft of long pines. Harpagones divided into a number plate. Basal appendages rounded, short, setose.

Type: No. 12196, U. S. National Museum.

Bahama Islands, West Indies.

Nassau, New Providence, July 2, 1903 (T. H. Coffin); New Providence Island, February 15, 1915 (H. G. Dyar).

Dr. Dyar obtained the larvæ in natural shallow pools in coral rock, but too late for the insertion of a description in this work.

CULEX SIMULATOR Dyar & Knab.

Culex simulator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 218, 1906.

ORIGINAL DESCRIPTION OF CULEX SIMULATOR:

Antennæ with the tuft at outer third, dark; upper head tuft double, lower single; body smooth; lateral hairs single on the second abdominal segment, double on the third to sixth; tracheæ narrow. Air tube 7 × 1, slightly flared at tip, with five tufts on the posterior margin; pecten very long, reaching one-third; lateral comb of the eighth segment scarcely over two rows deep. Anal segment long.

Taken by Mr. Busck in Arima, Trinidad, in the primeval woods. No adults were obtained.

Digitized by Google

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender..	5
5.	Air tube four times as long as wide or over.....	7
7.	Anal appendages four, normal.....	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout.....	19
19.	Air tube with long well-defined tufts.....	20
20.	Body glabrous or lightly granular.....	26
26.	Air tube concave, the tip expanded.....	27
27.	Pecten of the air tube of long spines; antennæ dark; lateral comb of the eighth segment scarcely over two rows deep...	*simulator*

DESCRIPTION OF LARVA OF CULEX SIMULATOR (ADULT UNKNOWN):

Larva, Stage IV (plate 105, fig. 352).—Head rounded, widest through eyes, narrowed before, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, slightly curved, thick and spined on basal two-thirds, with a large tuft from a notch; apically, three long setæ, a short one and a digit. Upper pair of dorsal head-hairs double, lower single, ante-antennal tuft multiple. Mental plate triangular, rather small, with a large, broad central tooth and seven on each side, the fifth distinct and slightly projecting. Mandible quadrangular; three filaments before tip; an outer row of cilia from a collar; a row of transverse rounded prominences on outer margin bearing short hair-tufts; dentition of two teeth with a small one between and a group of short spines below; a spine before, a long smooth filament, a shorter one and a row of feathered hairs within; process below bent, subcapitate, obscurely furcate, with a transverse and a longitudinal row of hairs and a slight tuft at tip of each limb; basal angle moderate, with a row of stout hairs within in line with basal hairs. Maxilla elongate, divided by a suture; inner half with long spines along margin, basal ones serrate; a row of short spines within and some cilia at base; a row of long hairs at tip running down along the suture; outer half with two filaments at basal third. Palpus rudimentary, with four long equal digits. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, single on second, double on third to sixth; tracheæ narrow; skin glabrous. Air-tube slightly concave, a little widened towards tip, six times as long as wide; pecten long, reaching to basal third, single teeth coarsely serrate on one side; five hair-tufts on posterior margin beyond pecten. Lateral comb of eighth segment of numerous spines in a patch about three rows deep; single spine elongate, widened at tip with an apical fringe of spinules. Anal segment twice as long as wide, ringed by the plate; dorsal tuft of long and short hairs on each side; a small lateral hair; ventral brush well developed, confined to the barred area. Anal gills long, longer than the segment, regularly tapered.

The larvæ live in swamps in forest.

Trinidad, West Indies.

Arima, larvæ in open pools in high forest, July 10, 1905 (A. Busck).

We have obtained no adults of *Culex simulator*. The larva somewhat resembles that of *Culex territans* in its apically expanded air-tube, but there is no reason to suppose it necessarily allied to that species.

CULEX LATISQUAMA (Coquillett) Dyar & Knab.

Tinolestes latisquama Coquillett, Proc. Ent. Soc. Wash., vii, 185, 1906.
Culex latisquamma Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 222, 1906.
Tinolestes latisquama Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 24, 1906.
Tinolestes latisquama Theobald, Mon. Culic., v, 627, 1910.

ORIGINAL DESCRIPTION OF TINOLESTES LATISQUAMA:

Scales brown, the appressed scales of the occiput, venter, front angles of abdominal segments, coxæ, and under side of the femora at their bases, yellow. Front and

Digitized by Google

middle tarsal claws of male with one tooth under one of the claws, none under the other, claws of the hind tarsi and all claws in the female simple. Length 3 mm.

Port Limon, Costa Rica. Seven males and five females collected by Mr. F. Knab.

Type.—No. 8298, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX LATISQUAMA:

Female.—Proboscis rather long, subcylindrical, slightly expanded at tip, labellæ conically tapered, pale; vestiture of black scales, with a bluish reflection. Palpi short, one-fifth as long as the proboscis, slender, black, with a few outstanding setæ. Antennæ rather long, with the joints subequal, rugose, pilose, black, second joint unusually long, cylindrical, half as long again as the succeeding one, pale at base; tori subspherical, with a cup-shaped apical excavation, luteous, black within; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, blackish brown, nude. Occiput blackish brown, clothed with narrow, curved, dark lustrous-brown scales, many erect, forked black scales with a coppery luster on the nape, cheeks dull whitish scaled; a row of bristles along ocular margins.

Prothoracic lobes elliptical, remote dorsally, clothed with pale-brownish scales and brown bristles. Mesonotum dark brown, with two narrow impressed lines; vestiture of narrow, curved, dark bronzy-brown scales and rows of long black setæ. Scutellum trilobate, testaceous, clothed with minute, curved dark-brown scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ brownish, with a large patch of elliptical flat scales, bluish or yellowish white, according to the light.

Wings ample, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell much shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales dark brown, black with a bluish luster on the costa, outstanding ones dense, ovate, densest on forks of second vein. Halteres whitish with darker knobs.

Abdomen subcylindrical, truncated at tip; dorsal vestiture black with a slight metallic reflection, a row of lateral, triangular, basal, segmental, yellowish-white spots; venter yellowish-white scaled, with broad indistinct brown apical segmental bands.

Legs rather slender; front and mid femora swollen and flattened, especially the mid pair; thickest at basal third; femora white at base and beneath nearly to tips; vestiture otherwise black, with a blue reflection above and a bronzy one beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Male.—Proboscis straight, hardly longer than in the female, but gradually expanded towards apex. Palpi one-half as long as proboscis, very slender, uniform, with a few setæ at tip; long joint without median constriction, penultimate about twice as long as thick, last joint minute; vestiture of blackish scales, without ciliation. Antennæ longer than the proboscis, sparsely plumose; last two joints long and slender, the last longest, rugose, pilose, black, the others shorter, but four times as long as wide, fusiform, only slightly thickened at insertions of hair-whorls, whitish on basal half, dark beyond the black rings at insertions of hair-whorls; hairs long, brown. Coloration similar to the female. Wings narrower than in female, the stems of the fork-cells longer. Abdomen subcylindrical, hardly longer than in the female, somewhat thickened towards apex, without distinct lateral spots, coarsely hairy apically, but without the usual lateral ciliation. Claws of front and middle legs unequal, of hind ones small and equal; formula, 1.0–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 8, fig. 54): Side-pieces more than twice as long as wide, with a conically tapered tip; marginal appendages on a slight subapical prominence consisting of a smaller and a larger rod, with cup-shaped expanded tips and

Digitized by Google

two setæ, each from a deep insertion. Clasp-filament large, stout, slightly swollen in middle, with an articulated subterminal claw. Harpes furcate, inner branch short, smooth, outer long and slender, its tip bent at nearly right angles and bearing a long row of teeth. Harpagones broad, twisted, furcated at outer third, with a short inner and a longer outer branch with a recurved tip. Basal appendages short, remote, setose.

Larva, Stage IV (see figure of the entire larva, plate 51).—Head broad, quadrate, wider than long, hind angles squarely rounded, sides straight, a notch at insertion of antennæ, front broad, arcuate; clypeus shallowly excavate centrally. Antennæ very long, stout, a large tuft at apical third, the portion beyond it slender; basal two-thirds densely spined; three long hairs, a short hair, and a digit at tip. Eyes large, pointed. Upper pair of dorsal head-tufts in fours, lower single and very close to upper; ante-antennal tuft multiple. Mental plate broadly triangular, a large central tooth and eight on each side, becoming more pointed and more remotely spaced basally, seventh tooth larger than the others, eight small. Mandible quadrangular, with four filaments from a notch before the tip; an outer row of cilia from a large collar; a row of little tufts from a prominence on the outer margin; dentition of four teeth on a process, the first much the longest, a slender tooth before, a group of short irregular teeth at base, a broad filament and eight hairs within; process below indistinctly furcate, with groups of small hairs; angle below small, but prominent, with a row of long hairs within; a row of long hairs at base. Maxilla elongate conical, tip rather sharply tapered, divided by a band-shaped suture; inner half with a row of stout hairs on margin and a shorter row within; a row of long hairs at tip, running down along the suture; outer half with two filaments next the suture before the middle. Palpus small, somewhat tapered, with small irregular terminal digits. Thorax angularly rounded, wider than long; hairs very long, mostly single or double, but in tufts laterally on the meso- and metathorax. Abdomen rather slender, anterior segments short, seventh segment distinctly elongate; lateral hairs long on first two segments multiple on first, double on second, short and double on third to fifth, very long and single on sixth. Tracheal tubes narrowly band-shaped, slightly irregular. Air-tube very long and slender, a little widened at base, else straight and uniform, about ten times as long as wide; pecten fine, reaching nearly one-third, the single teeth broad with two or three stout branches; no hairs. Lateral comb of eighth segment of many spines in a triangular patch, those on anterior margin of patch small and dense, posterior ones larger and longer; single spine angularly elliptical, evenly fringed with spinules. Anal segment as long as wide, ringed by the plate; dorsal tuft of two long hairs and a small brush on each side; ventral brush well developed, moderately long, confined to the barred area. Anal gills small, not as long as the segment, conically pointed.

The larvæ live in the water in the holes made by certain crabs along the seashore. The adults frequent the upper parts of the holes. Mr. Knab observed the adults to fly out of the holes when frightened, but remain near and finally return. They showed no inclination to bite or even alight upon the person. The water in the holes was at a considerable distance below the surface and difficult to reach.

Costa Rica and Panama.

Port Limon, Costa Rica, September 25, 1905 (F. Knab); Caldera Island, Porto Bello Bay, Panama, January 23, 1908 (A. H. Jennings).

A new genus has been erected for this species, but upon characters of minor importance, and we consider it not worthy of recognition. The larva described above as belonging to this species has not been bred, but, as it was obtained from the same crab-holes with the adults, the association is probably correct.

Digitized by Google

CULEX BISULCATUS (Coquillett) Dyar & Knab.

Micraëdes bisulcatus Coquillett, Proc. Ent. Soc. Wash., vii, 185, 1906.
Culex bisulcatus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 208, 1906.
Culex bisulcatus Dyar, Proc. Ent. Soc., Wash., viii, 18, 1906.
Micraëdes bisulcatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 24, 1906.
Culex bisulcatus Pazos, Sanidad y Ben., ii, 49, 558, 1909.
Micraëdes bisulcatus Theobald, Mon. Culic., v, 486, 1910.

ORIGINAL DESCRIPTION OF MICRAËDES BISULCATUS:

Scales of palpi and proboscis black, those of the occiput yellow. Mesonotum brown-scaled, a pair of subdorsal bare lines on its anterior three-fourths. Abdomen black-scaled, the front angles of the segments whitish-scaled. Scales of the legs black, those on under side of femora basally whitish; claws of the front and middle tarsi of the male with a tooth under one claw, none under the other, those of the hind feet simple; female with all the claws simple. Scales of wings brown. Length about 3 mm.

Guadeloupe and Santo Domingo, West Indies. Two males and one female, collected by Mr. A. Busck.

Type.—No. 8291, U. S. National Museum.

The larva differs widely from that of *Aëdes fuscus;* the body bears many large clusters of rather short, stiff hairs, and there are about eight tufts on the breathing tube.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX BISULCATUS:

Female.—Proboscis moderate, slightly swollen at apex, labellæ conically tapered; vestiture black, with a purplish reflection throughout; setæ minute, curved black, those on the labellæ more prominently outstanding. Palpi long, brown, two-fifths as long as proboscis, three-jointed, last joint longer than the two preceding, with some outstanding setæ at base. Antennæ moderate, joints subequal, rugose, pilose, black, second joint stout, swollen; tori subspherical, with a cup-shaped apical excavation, pale, yellowish-brown within; hairs of whorls sparse, black, and rather short. Clypeus triangular, convex, brown. Eyes black. Occiput black, rather sparsely clothed with narrow, curved, pale scales, in middle, white along margin of eyes and lower parts of sides, many erect, forked brown scales on vertex; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow, curved, pale scales and brown bristles. Mesonotum pale brown, with two narrow, bare, impressed lines; vestiture of coarse but rather sparse narrow, curved bronzy brown scales; bristles brown, long. Scutellum trilobate, pale, clothed with narrow pale brown scales, each lobe with a group of brown bristles. Postnotum elliptical, luteous, brown in the middle, nude. Pleuræ pale luteous, with rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip, clothed dorsally with black scales, with a slight bronzy and blue-metallic reflection, a row of lateral, triangular, basal, segmental, dull-white spots; venter clothed with dirty yellowish-white scales, tips of posterior segments blackish; apical part of abdomen with coarse brown bristles.

Wings moderate, hyaline; petiole of second marginal cell nearly one-fourth as long as its cell, that of second posterior cell considerably shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins brownish black, with blue luster on costa, long, linear. Halteres white with black knobs, stems slender, the knobs large.

Legs slender, rather long; femora black above, basally whitish beneath; tibiæ black, with bronzy and blue luster; tarsi black scaled, with bronzy and blue reflection; femora and tibiæ both dark at tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis straight, gradually enlarged towards apex. Palpi two-fifths as long as proboscis, slender, uniform, without hairs, vestiture of brown scales, without markings. Antennæ with last two joints long and slender, rugose,

Digitized by Google

pilose, black, the others short, but rather longer than usual, whitish, with a black ring at insertions of hair-whorls; hairs long, brown, and appearing less plumose than usual. Coloration similar to the female. Abdomen elongate, depressed, thickened towards apex; dorsally a few whitish scales at bases of segments, forming obscure bands; ends of segments with coarse setæ, bristly posteriorly, no lateral ciliation. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wings 2.5 mm.

Genitalia (plate 8, fig. 55): Side-pieces twice as long as wide, tips conically tapered, an irregular median prominence divided into three portions, upper one short, with three stout setæ, the others each with a single rod, the middle one the longest. Clasp-filament long, slender, with an articulated terminal spine. Harpes with a slender branch, curved at tip, bearing a row of teeth, outer branch short and rounded. Harpagones divided at right angles, both branches simple and pointed, the inner one the longer.

Larva, Stage IV (plate 102, fig. 340).—Head rounded, broad, laterally lobed behind the antennæ, a notch at their insertion, narrowly excavate between the long clypeal spines. Antennæ long, with a large tuft a little before the middle, basal portion before tuft stouter than apical part, well spined; three long setæ, a short one and a digit at tip. Both pairs of dorsal head-tufts and ante-antennal tufts multiple. Mental plate quadrate, with triangular tip, a stout central tooth and eight on each side, becoming longer basally, the last one stout and projecting. Mandible quadrangular, widened outwardly; two long filaments and two short ones before tip; an outer row of cilia from a collar; a row of feathered filaments with short tufts at their bases arising from low angular prominences on outer margin; dentition small, except the first, which is long, the four teeth confused with two small ones below; a short spine before, two long serrate filaments and five feathered ones within; process below elongate, curved basally, obscurely furcate, with a row of hairs on outer margin; basal angle obsolete; a row of long hairs within; a row of long hairs at base. Maxilla elongate, rounded at tip, divided by a suture; inner half with two rows of very long, stout hairs and some fine ones; a row of long hairs at tip; outer half with two small filaments near the suture. Palpus slender, with four long claw-like apical digits. Thorax rounded, wider than long, hairs abundant. Abdomen moderate, the anterior segments shorter; lateral hairs in twos after second abdominal segment, the pair on sixth segment very long; short hairs in very coarse, stellate tufts. Air-tube long, about eight times as long as wide, slightly tapered to tip; pecten very long, reaching nearly half way, followed by three sparse hair-tufts, two lateral tufts, one within pecten, the other at apical fourth; single spine of pecten with short branches running nearly to tip. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, fringed evenly with long spinules or with a smooth appendix at tip. Anal segment longer than wide, ringed by the plate; dorsal tuft of four long unequal hairs on each side; a fringe of very long spines on posterior margin of plate; a single lateral hair; ventral brush well developed, of sparse tufts, confined to the barred area. Anal gills moderate, tapered.

The larvæ live in the water at the bases of leaves of Bromeliaceæ and also in artificial receptacles. Mr. Busck got them in a bromeliad and in a Spanish bayonet; Mr. Tower and Dr. Pazos obtained them in artificial receptacles. Dr. Pazos states that the adults fly and bite in the daytime. He has found the adults in caves near the river Ariguanabo (Cuba).

Digitized by Google

Antilles.

La Soufrière, Guadeloupe, 3000 feet altitude, July 30, 1905 (A. Busck); Santo Domingo, August 15, 1905 (A. Busck); Mayaguez, Porto Rico, September (W. V. Tower); San Antonio de los Baños, Cuba (J. H. Pazos).

This species was described under a separate genus on account of the short palpi of the male. We do not find it to be otherwise separable from *Culex* and consider this modification an unessential character.

CULEX CONSERVATOR Dyar & Knab.

Culex conservator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 208, 221, 1906.
Culex divisor Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 208, 222, 1906.
Culex conservator Dyar, Proc. Ent. Soc. Wash., viii, 18, 1906.
Isostomyia perturbans Coquillett (not *Aedes perturbans* Williston), U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 24, 1906.
Isostomyia perturbans Theobald (not *Aedes perturbans* Williston), Mon. Culic., v, 627, 1910.

ORIGINAL DESCRIPTION OF CULEX CONSERVATOR:

Antennæ with the tuft beyond the outer third, dark; air-tube 8 × 1, a single hair at the middle; pecten not reaching one-third. Anal segment long with short gills.

Collected by Mr. Busck in a hollow tree in the village of St. Joseph, Trinidad. Also in hollow trees near Montserrat, Trinidad, and Fort de France, Martinique, but these are broken and we do not feel sure of them. All were labelled "*Aëdes perturbans* Will." by Mr. Coquillett. Blanchard refers *perturbans* Will. to the genus *Wyeomia* (Sabethinæ) and makes it the same as *W. grayii* Theob. Apparently nobody knows what Williston's species really was; it may be our *C. conservator* or *C. divisor* or some other species, more probably the latter, we believe.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender..	5
5.	Air tube four times as long as wide or over.....	7
7.	Anal appendages four, normal.....	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout.....	19
19.	Air tube with small double or single hairs, or bare.....	31
31.	Air tube uniform, without any swelling.....	32
32.	Air tube with single hairs or bare.....	37
37.	Pecten of numerous teeth densely and regularly spaced.....	38
38.	Lateral abdominal hairs single on segments 3 to 5.....	*conservator*

ORIGINAL DESCRIPTION OF CULEX DIVISOR:

The characters are included in the table, all that can be demonstrated in the rather badly damaged material, which suffered in transit.

It was collected by Mr. Urich in Trinidad; ten specimens were bred from the same egg mass collected in a hollow bamboo joint. The egg mass was floating free, the eggs stuck together by their sides in the normal way. Mr. Coquillett has identified the adults as "*Aëdes pertinans* Will.," which may be correct. The species *pertinans* has, however, been referred to the Sabethinæ, and we do not feel justified in accepting the same till someone has examined Williston's types. Mr. Coquillett's results, especially in the genus *Culex*, have produced in our minds a feeling of most profound distrust, and we are not prepared to accept anything that he says without corroboratory evidence.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender..	5
5.	Air tube four times as long as wide or over.....	7
7.	Anal appendages four, normal.....	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout.....	19
19.	Air tube with small double or single hairs, or bare.....	31
31.	Air tube uniform, without any swelling.....	32
32.	Air tube with single hairs or bare.....	37
37.	Pecten of numerous teeth densely and regularly spaced.....	38
38.	Lateral abdominal hairs double on segments 3 to 5.....	39
39.	Air tube with a single small hair or none.....	40
40.	Pecten of the air tube reaching to one-fourth.....	*divisor*

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX CONSERVATOR:

Female.—Proboscis long, slender, swollen apically, labellæ conically tapered; vestiture black with a bronzy and blue reflection; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, less than one-fifth as long as proboscis, slender, uniform, black, with a few outstanding setæ at base. Antennæ rather long, the joints subequal, rugose, pilose, blackish, second joint longer than third and slightly stouter; tori subspherical, with a cup-shaped apical excavation, luteous, brown on inner side, hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, brown, nude. Eyes black. Occiput brown, clothed with narrow, curved pale-brown scales, with many erect, forked brown ones intermixed, flat white scales below on the sides, margin of eyes white-scaled; a row of bristles along margins of eyes.

Prothoracic lobes pale, with brown bristles. Mesonotum brown, with two narrow, bare lines on anterior half; vestiture of narrow, curved bronzy-brown scales, with paler ones on anterior margin and sides of disk; bristles long, coarse, black. Scutellum trilobate, with similar vestiture to the mesonotum, each lobe with a group of long, coarse, black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ pale greenish with a few white scales and rows of pale bristles.

Abdomen subcylindrical, truncate at tip; dorsal vestiture uniformly bronzy black, a row of pale bristles at tips of segments; venter yellowish-white scaled, with submetallic luster.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell about equal to its cell; basal cross-vein more than its own length from anterior cross-vein; scales of veins brown with a blue reflection on costa, broadly linear, denser on forks of second vein and apical half of third. Halteres whitish, with black knobs.

Legs slender, rather long; vestiture blue black with a bronzy reflection, femora pale beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis long, swollen at tip, bent at middle, scales roughened at bend. Palpi one-sixth as long as proboscis, small, very slender, black, without hairs. Antennæ rather long, the last two joints long and slender, rugose, pilose, blackish, the others short, but longer than usual, whitish with black rings at insertions of hair-whorls; hairs long, dense, appearing less plumose than usual, black. Coloration as in the female. Wings slightly narrower than in the female, the stems of the fork-cells about the same, vestiture also similar. Abdomen subcylindrical, somewhat swollen towards tip, bristles at ends of segments coarse, but rather sparse; end of abdomen bristly; no lateral ciliation. Claw formula, 1.0–1.0–0.0.

Length: Body about 3.5 mm.; wing 2.5 mm.

Genitalia (plate 11, fig. 75): Side-pieces over twice as long as wide, tips conically tapered, a large inner prominence widely divided into two portions, outer subapical, inner median, the outer bearing three rods with hooked tips and a leaf-like appendage, the inner bearing two subcapitate rods. Clasp-filaments moderate, somewhat enlarged at base, with a row of membranous serrations on one margin on outer two-thirds, a stout articulated terminal claw, a large densely setose area below middle of side-piece. Harpes long, columnar, slightly widened at tip and bearing four teeth, apparently unbranched. Harpagones with inner arm long spatulate, rounded, outer arm apparently aborted.

Larva, Stage IV (plate 110, fig. 372).—Head rounded, widest through eyes, bulging on sides, a notch at insertion of antennæ, front margin arcuate, with a shallow excavation between clypeal spines. Antennæ large, well spined, a notch

Digitized by Google

and large tuft at outer fourth; three long setæ, a short one and a digit at tip. Mental plate small with a large prominent central tooth and seven small ones on each side, the last one remote. Mandible quadrangular; three filaments before tip; an outer row of cilia from a collar which is prolonged inwardly toward basal articulation; a row of rounded conical prominences within outer margin, each bearing a long tuft of feathered hairs; dentition of a single tooth with two stout spines below; two filaments and a row of feathered hairs within; process below thick and curved basally, angled just below dentition, tip widely furcate, lower limb with a small process beneath, two rows of hairs and a tuft on each limb; basal angle very slight with a row of hairs within and another at base. Maxilla elongate, rounded at tip, divided by a suture; inner half with a row of long spines on margin, a row of short ones within and a line of cilia near base; a row of long hairs at tip running down along the suture; outer half with two small filaments below the middle. Palpus small with four long irregular digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in fives on first segment, in threes on second, in twos on third to fifth, a single long one on sixth; skin smooth. Air-tube long, straight except at base, nine times as long as wide; pecten rather long, running to basal fourth, the teeth simple; four small single hairs beyond pecten. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at tip, with an apical fringe of spinules. Anal segment twice as long as wide, ringed by the plate; dorsal tuft of two long hairs on each side; ventral brush moderate, confined to the barred area. Anal gills short, about half as long as the segment, roundedly tapered.

The larvæ live in hollow trees and similar locations. Mr. Busck got them in hollow trees and Mr. Urich in bamboo-joints. The eggs are laid in raft-shaped masses floating on the surface of the water.

West Indies: Trinidad and Lesser Antilles.

St. Joseph, Trinidad, June 15, 1905 (A. Busck); Montserrat, Trinidad, June 29, 1905 (A. Busck); Tobago Island, July (A. Busck); Fort de France, Martinique, July 20, 1905 (A. Busck); Trinidad (F. W. Urich).

Coquillett identified the present species as *Aëdes perturbans* Williston, and created for it the genus *Isostomyia*. We are informed by F. W. Edwards that the species described by Williston as *Aëdes perturbans* is a sabethine. Consequently Coquillett's identification is in error, the species before us being a *Culex*. The name *Isostomyia*, although based as a *Culex*, must follow its alleged type and becomes a sabethine genus (see page 187). *Culex conservator* and *Culex divisor* were described from larvæ supposed to differ in the number of lateral hairs on the abdominal segments. A re-examination shows that an error of observation was made in one case and that the larvæ are really alike. The description under *Culex divisor* is correct and should apply to both. The erection of a separate genus for this species, on account of the short palpi of the male, seems to us to be unwarranted.

CULEX CHRYSONOTUM Dyar & Knab.

Culex chrysonotum Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 57, 1908.
Culex chrysonotum Theobald, Mon. Culic., v, 615, 1910.

ORIGINAL DESCRIPTION OF CULEX CHRYSONOTUM:

Female.—Proboscis black-scaled, rather long, gradually enlarged toward the apex; palpi black-scaled, with a few metallic scales at the apices; occiput clothed with golden scales, becoming brownish at the sides, margins of the eyes whitish-scaled; mesonotum clothed with narrow golden scales, the posterior portion dark brown-scaled, two golden lines extending from the golden area backward to the scutellum on each side of the antescutellar bare space; scutellum golden-scaled; pleura with whitish scales; abdomen depressed, blunt at the apex, dark-scaled, with strong

Digitized by Google

coppery luster and dark blue reflections in some lights, no dorsal segmental bands; segments 5, 6, and 7 with silvery basal lateral spots; beneath the segments have broad silvery white bands at the bases, the apices dark-scaled, with coppery luster; wings with narrow dusky scales along the veins; legs dark-scaled, with strong bronzy luster, the ventral surface of the femora silvery-scaled, the inner side of the tibiæ obscurely silver-scaled, the knees touched with silver scales; tarsi not ringed; claws simple. Length 3 mm.

Male.—Proboscis long and slender, enlarged at the apex; palpi considerably longer than the proboscis, black-scaled, without annulations, the apical portion clothed with long black hairs; head and thoracic markings as in the female; abdomen dark-scaled above, with coppery luster; segments 4 to 8 with basal lateral silvery spots; the under surface with silvery basal segmental bands. Length, 3 mm.

Nine specimens, Ancon, Canal Zone, Panama; Cartagenita, Paraiso District, and Miraflores in the Canal Zone, bred from larvæ in a ditch, from a small patch of algæ beside railroad track, and from a swamp (A. H. Jennings).

Type.—Cat. No. 11966, U. S. N. M.

Similar to *C. spissipes* Theobald and *C. fur* Dyar and Knab, but easily distinguished by the narrow wing-scales and the more extensive golden area of the mesonotum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX CHRYSONOTUM:

Female.—Proboscis rather long, stout, somewhat enlarged at apex, vestiture black with a slight bronzy reflection; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, clothed with bronzy-black scales, a few coarse bristles near base. Antennæ moderate, joints subequal, second joint slightly swollen, others coarsely rugose, pilose, blackish; tori subspherical with a cup-shaped apical excavation, blackish; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, blackish. Occiput dark brown, clothed with dense, narrow, curved golden scales on vertex, flat whitish ones on sides, many upright, forked golden scales on nape; a row of coarse black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, dark brown, clothed with narrow, curved dark-brown scales and black bristles. Mesonotum dark brown, clothed with narrow, curved scales, anterior two-thirds golden yellow, posterior third dark brown, with six narrow lines of golden scales reaching from anterior golden area to scutellum, two of these lines bordering ante-scutellar space, another pair, outward from these, third pair above roots of wings; some dark-brown scales along the lateral margins which form an indentation behind anterior angle and before root of wing. Scutellum trilobate, dark brown, clothed with narrow, curved golden-yellow scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ blackish brown, clothed with patches of dirty-white scales and rows of dark bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of black scales with a bronzy luster, a row of pale bristles at tip of each segment; a row of lateral, basal, segmental, large, triangular, dull silvery white patches on fifth, sixth and seventh segments; venter blackish scaled, with narrow, segmental, basal white bands.

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins brown, with a blue reflection on costa, outstanding one linear, those on forks of second and fourth veins and on apical portion of third vein broader, rounded, and very dense. Halteres brownish with minute white scales.

Legs moderate, middle femora stout; vestiture of black scales, with blue and bronzy luster, femora pale beneath with a brassy luster; front and mid tibiæ and tarsi with a brassy luster on under side; knees narrowly pale scaled. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Digitized by Google

Male.—Proboscis long and straight, slightly enlarged towards apex, black scaled. Palpi slender, exceeding proboscis by nearly the length of last two joints, tip of long joint and the last two joints with numerous long black hairs, slightly enlarged; vestiture of black scales, with bronzy and blue luster, without rings. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls, hairs long, dense, black. Coloration similar to the female. Wings hardly narrower, the stems of the fork-cells slightly longer, vestiture nearly the same. Abdomen long, somewhat enlarged apically, ends of segments with long hairs, tip with numerous coarse bristles, lateral ciliation coarse, sparse, rather short, the segmental basal lateral white spots larger than in the female and narrowly united dorsally on some of segments. Claw formula, 1.1–1.1–0.0.

Length: Body about 2.5 mm.; wings 2.5 mm.

Genitalia (plate 11, fig. 78): Side-pieces over twice as long as wide, tips rather sharply conically tapered; prominences on inner side divided into three portions, arising close together; outer branch slender, bearing a rod with hooked tip, a narrow leaf-like appendage and five setæ; central branch not as long as outer one, bearing a single long, stout filament with hooked tip; third branch still shorter and bearing an appendage similar to that of the middle branch. Clasp-filament stout, attenuated in middle, tip expanded, divided by a groove, bearing a small terminal spine, outer aspect roughened with coarse denticles. Harpes with outer branch represented by an angle only, inner one long, slender, ending in comb of evenly spaced teeth. Harpagones lamellate, scarcely divided, extending in a curved broad plate with slightly revolute edges and emarginate tip. Basal lobes rounded, thick, setose.

Larva, Stage IV (plate 108, fig. 362).—Head rounded, broad, widest through eyes, much wider than long; antennæ large, prominent, a large tuft beyond middle, the part of shaft beyond this more slender; two of the terminal hairs considerably removed from apex; shaft spinose. Skin abundantly pilose; lateral abdominal hairs in threes on first segment, twos on second, fives on third, threes on fourth to sixth. Lateral comb of eighth segment of rather few spines, two rows deep. Air-tube rather slender, about six times as long as wide, very slightly widened at extreme tip; terminal hooks large and curved, with median tooth; pecten covering the basal two-fifths, the teeth short, evenly spaced; six large multiple tufts on posterior line, the first well within pecten, the last far before apex. Anal segment longer than wide, ringed by the plate, which is spinose on its posterior border; dorsal tuft of three hairs of different lengths on each side; ventral brush large, confined by the chitinous ring. Anal gills short, equal, considerably shorter than anal segment.

The larvæ live in ground-pools, often with algæ. Mr. Jennings got them in a ditch in open ground, in a small pool with algæ beside a railroad track, and in a swamp back of a dump.

Panama.

Ancon, Canal Zone, November 18, 1907 (A. H. Jennings); Cartagenita, Paraiso District, Canal Zone, November 16, 1907 (A. H. Jennings); Mirafiores, Canal Zone, December 10, 1907 (A. H. Jennings); Tabernilla, Canal Zone, December 15, 1908 (A. H. Jennings).

CULEX SPISSIPES (Theobald) Dyar & Knab.

Melanoconion spissipes **Theobald, Mon. Culic., iii, 242, 1903.**
Melanoconium spissipes **Blanchard, Les Moustiques, 396, 1905.**
Melanoconion spissipes **Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 24, 1906.**
Melanoconion spissipes **Peryassú, Os Culicid. do Brazil, 49, 238, 1908.**
Culex spissipes **Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 58, 1908.**
Melanoconion spissipes **Theobald, Mon. Culic., v, 457, 1910.**

Digitized by Google

ORIGINAL DESCRIPTION OF MELANOCONION SPISSIPES:

Head black; thorax with the anterior half golden, the posterior half black; pleuræ brown. Abdomen black, unbanded, with small lateral basal white spots and pallid venter. Legs black, unbanded, the middle pair very thick and rather flattened.

♀. Head black, with narrow-curved dusky scales, black and deep brown upright forked scales, and flat black lateral ones; antennæ deep brown, one side of the basal joint and the base of the second joint testaceous; palpi and proboscis black; the frons slightly projects as a knob; clypeus black; eyes silvery. Thorax black, the front half covered with narrow-curved bright golden scales, the posterior half with small curved black and bronzy scales and with numerous long black bristles; there are also black bristles projecting from the front of the thorax; scutellum black, with narrow-curved dull golden scales and eight black bristles to the median lobe; metanotum deep black; pleuræ brown, with some grey scales.

Abdomen entirely black above, with moderately long dull golden border-bristles, laterally at the base of the segments are small white patches of scales; venter pallid, with an ochraceous tinge on the apical portion, grey at the base; the base of the segments palest.

Legs black; coxæ brown; venter of femora, especially of the hind pair, pale; the fore femora are swollen and the mid pair of legs prominently swollen, having a somewhat flattened appearance; hind legs long; ungues equal and simple.

Wings with typical brown *Melanoconion* scales; first sub-marginal cell longer and narrower than the second posterior cell, its base a little the nearer the base of the wing, its stem rather less than half the length of the cell; stem of the second posterior rather more than half the length of the cell; posterior cross-vein nearly twice its own length distant from the mid; halteres with pale stem and black knob.

Length.—4.5 mm.

Habitat.—Trinidad (C. W. Hewlett).

Observations.—Described from a single ♀. It cannot be mistaken for any other member of the genus on account of the thoracic ornamentation and the curious thick flattened mid legs. The black velvety ground colour and the golden thorax and pale venter form a strong contrast.

DESCRIPTION OF FEMALE OF CULEX SPISSIPES (MALE AND LARVA UNKNOWN):

Female.—Proboscis long and slender, slightly enlarged apically, vestiture black with a bronzy and blue reflection; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, clothed with black scales. Antennæ moderate, joints subequal, second joint one and one-half times as long as third, pale at base, the others rugose, pilose, blackish; tori subspherical, with a cup-shaped apical excavation, dark brown, pruinose. Clypeus triangular, prominent, dark brown, pruinose. Occiput dark brown, clothed with narrow, curved golden-brown scales above, with flat white appressed ones on sides below, many erect, forked black scales on nape; a row of black setæ along margins of eyes.

Prothoracic lobe elliptical, remote dorsally, dark brown, clothed with black bristles. Mesonotum dark brown, anterior half clothed with narrow, curved golden-yellow scales, shortly produced backward on subdorsal ridges, a patch of these on each side of ante-scutellar space nearly joining the anterior golden area; posterior half of mesonotum is otherwise clothed with dark golden-brown scales; there are two small patches of brown scales on anterior third within golden area; setæ coarse, dark brown. Scutellum trilobate, dark brown, clothed with narrow, curved golden-yellow scales, each lobe with a tuft of dark-brown bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ dark brown, with rows of pale bristles and small patches of dull-white scales.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of blackish-brown scales and a row of pale bristles at tip of each segment, a row of lateral, basal segmental, triangular yellowish-white patches; venter yellowish-white scaled, the two last segments broadly black at tips.

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell considerably shorter than its cell; basal

Digitized by Google

cross-vein distant more than its length from anterior cross-vein; scales of veins brown with a blue reflection on costa, outstanding ones ovate, dense on forks of second and fourth veins, third and upper branch of fifth. Halteres whitish, with black knobs.

Legs moderate; middle femora stout; vestiture of black scales, with bronzy and blue luster, the femora paler beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wings 3.5 mm.

Life history and habits unknown.

Island of Trinidad, West Indies.

Trinidad, West Indies (F. W. Urich).

The species was founded upon a single female specimen. We have before us a single female from the type locality, which we have identified as *Culex spissipes*. It differs from Theobald's description and figure in having a pair of small brown spots within the area of golden coloration on the anterior part of the thorax. We venture to think that this marking may have been overlooked by Mr. Theobald, and so make the identification in spite of the apparent discrepancy. Dr. Peryassú's description appears to be but a translation of Theobald's, and so adds no new information. The species is allied to *Culex fur*, which differs principally in having the above-mentioned brown spots of considerable size, and it is possible that further material may show the two species to be the same.

CULEX FUR Dyar & Knab.

Culex fur Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 13, 1907.
Culex fur Busck, Smiths. Misc. Colls., quart. iss., iii, 70, 1908.
Culex fur Theobald, Mon. Culic., v, 613, 1910.

ORIGINAL DESCRIPTION OF CULEX FUR:

Proboscis black; head broad, black behind the eyes; thorax with the anterior half covered with brassy scales, two large dark patches within this area on the disk before; posterior half of the thorax deep brown. Abdomen black above, the hind margins of the segments with yellowish hairs; beneath dirty gray. Legs black. Wings brown scaled along the veins, the scales on the apical portion broad. Tarsal claws simple.

One specimen, ♀, Colon, Panama (A. C. H. Russell).

***Type*.—Cat. no. 10259, U. S. Nat. Mus.**

The larva is unknown to us.

DESCRIPTION OF FEMALE OF CULEX FUR (MALE AND LARVA UNKNOWN):

Female.—Proboscis long and slender, slightly swollen at tip, vestiture black with a bronzy and blue reflection; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, clothed with black scales. Antennæ moderate, the joints subequal, second joint one and one-half times as long as third, pale at base, others rugose, pilose, blackish; tori subspherical, with a cup-shaped apical excavation, dark brown within, yellowish without, pruinose. Clypeus triangular, prominent, dark brown, pruinose. Occiput dark brown, clothed with narrow, curved golden scales above, with flat white appressed ones on sides below, many erect, forked black scales on nape; a row of black setæ along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, dark brown, clothed with black bristles. Mesonotum dark brown, anterior half clothed with narrow, curved golden-yellow scales, hind margin of patch indented on median line and a patch of these on each side of ante-scutellar space, posterior half of mesonotum otherwise clothed with dark-brown scales; a large patch of brown scales on each side of middle within the golden area; setæ dark brown. Scutellum trilobate, dark brown, clothed with narrow, curved golden-yellow scales, each lobe with a tuft

Digitized by Google

of dark-brown bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ dark brown with rows of pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of blackish-brown scales and a row of pale bristles at tip of each segment, a row of lateral, basal, segmental, triangular yellowish-white patches; venter yellowish-white scaled, the two last segments broadly black at their tips.

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell considerably shorter than its cell; basal cross-vein distant more than its length from anterior cross-vein; scales of veins brown, with a blue reflection on costa, the outstanding ones ovate, dense on third vein, forks of second and fourth, and upper branch of fifth.

Legs moderate; middle femora stout; vestiture of black scales with bronzy and blue reflection, underside of femora whitish. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Life history and habits unknown.

Panama.

Colon (A. C. H. Russell).

We have seen but a single female specimen. Neither Mr. Busck nor Mr. Jennings has been able to find the species. It is allied to *Culex spissipes*, and, possibly, but a variety thereof. Our material of both species is, however, too slender to allow us to form a positive opinion.

CULEX ERYTHROTHORAX Dyar.

Culex erythrothorax Dyar, Proc. U. S. N. M., xxxii, 124, 1907.
Culex erythrothorax Theobald, Mon. Culic., v, 615, 1910.

ORIGINAL DESCRIPTION OF CULEX ERYTHROTHORAX:

Head golden, reddish scaled behind, the eyes with a narrow white border; proboscis blackish; palpi red brown; antennæ black. Thorax light red, the scales fine, golden brown, striped by two impressed discolorous areas in the membrane; sides light golden scaled; legs blackish, the femora and tibiæ broadly pale below, unbanded. Abdomen black above, mixed with pale ocherous scales, the bases of the segments with rather pale ocherous bands mixed with a few dark scales; beneath with pale ocherous scales and golden hairs.

Eighty specimens, Nigger Slough, Gardena; slough at San Onofre; Sweetwater Junction, swamp full of reeds; Guadaloupe, slough covered with reeds (A. N. Caudell); Salinas, California, a pool in a river bed choked with vegetation.

Type.—Cat. No. 10009, U. S. N. M.

The adults could only be taken in the midst of the tall reeds that covered shallow sloughs by wading into the water. A person sitting on the bank was immune from their attacks, but among the reeds they bit viciously in the daytime. The larvæ occurred among the reeds, resting quietly at the surface in the *Lemna*, though fish were present in all the sloughs. *Culex tarsalis* and *Anopheles* were generally present also, the mass of vegetation doubtless shielding them from the fish.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX ERYTHROTHORAX:

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture of black scales with a pale bronzy reflection, whitish beneath; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, one-sixth as long as proboscis, slender, reddish brown, with few outstanding setæ, black scaled. Antennæ with joints subequal, rugose, pilose, black, second joint slightly swollen, pale at base; tori subspherical with a cup-shaped apical excavation, yellowish, darker within; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, reddish brown, nude. Occiput orange brown, clothed with narrow, curved golden-brown scales, sordid whitish along margins of eyes and lower parts of sides, the scales on lower part of sides flat, appressed; many erect, forked brown scales on nape; a row of black bristles along ocular margins.

Digitized by Google

Prothoracic lobes elliptical, remote dorsally, with pale scales and brown bristles. Mesonotum light brownish red, with two narrow obscure paler lines; vestiture of small, narrow, curved, bright golden-brown scales, those around ante-scutellar space paler, and rows of dark setæ. Scutellum trilobate, brown, clothed with minute, curved, pale-ochraceous scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, reddish luteous, nude. Pleuræ and coxæ reddish luteous, with remote patches of narrow, elliptical, whitish scales and rows of small brown bristles.

Abdomen subcylindrical, truncated at tip; dorsal vestiture dull black, a moderately narrow ill-defined ochraceous soiled band at base of each segment, widening on sides; first segment with a patch of whitish and black scales on the dorsum and with pale hairs; venter sordid ochraceous scaled.

Wings ample, hyaline; petiole of second marginal cell one-fifth as long as its cell, that of second posterior cell somewhat shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales brownish black with a blue reflection on costa, outstanding one long, linear, denser on forks of second and fourth veins. Halteres whitish, with reddish knobs.

Legs moderate, femora yellowish white on underside to tip, slender; vestiture otherwise brown with a bluish reflection above and a strong brassy one beneath; knees and tips of hind tibiæ yellowish white. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

Male.—Proboscis long and slender, slightly enlarged towards apex, with a pale shade beneath, particularly towards apical half. Palpi exceeding proboscis by nearly the length of the last two joints, which with the end of the long joint bear many black hairs, yellow at base of penultimate joint; vestiture of dark scales with a strong bronzy luster, a small patch of white scales above at base of penultimate joint, a patch of silvery scales beneath at bases of last two joints; a line of pale shining scales along under surface. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, ringed with black at insertions of hair-whorls; hairs long, black, brownish at base. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells slightly longer; vestiture somewhat sparser. Abdomen long, subcylindrical and slender basally, depressed and somewhat expanded towards apex; dorsal segmental pale bands broad and expanded laterally, reaching apices on sixth and seventh segments, last segment all pale-scaled above; lateral ciliation abundant, very long, pale yellow. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Genitalia (plate 16, fig. 115): Side-pieces more than twice as long as wide, tips conically tapered, marginal appendages on a truncate subapical prominence consisting of three rods with hooked tips, a leaf-like appendage and two setæ. Clasp-filament moderate, rather stout, curved, with a rather long, articulated, terminal spine. Harpes furcate, the outer arm long, curved, simple, the inner with a tuft of dense spines at apex. Harpagones furcate, the inner branch short, pointed, the outer divided into numerous overlapping teeth. Basal appendages, small, remote, bearing a few setæ.

Larva, Stage IV (plate 102, fig. 339).—Head rounded, widest through eyes; antennæ long and rather stout, a large tuft at outer third, part beyond it slender, basal part of shaft spinulose; upper head-hairs in fives, lower in threes, ante-antennal tuft multiple. Body with skin smooth; lateral abdominal hairs in twos after second segment; lateral comb of eighth segment of many spines in a large triangular patch. Air-tube straight, slightly and gradually tapering to tip, seven times as long as wide; terminal hooks minute; pecten of thirteen small teeth on basal fourth of tube, followed by five rather small two or three-haired

Digitized by Google

tufts, the basal one beyond end of pecten, the subapical one moved laterally out of line. Anal segment longer than wide, ringed by plate; dorsal tuft of three hairs of different lengths on each side; ventral brush confined by the chitinous ring. Anal gills small, about half as long as the segment, tips bluntly pointed, all four of nearly equal length.

The larvæ live in sloughs of permanent water which are filled by tall reeds, the water containing also aquatic plants and fish. Dr. Dyar found them several times in such situations and Mr. Caudell found them in a similar location. The adults do not come out of the reeds covering the sloughs, but a person entering among the reeds will be quickly bitten. It is probable that the mosquitoes feed normally upon the birds that frequent these reeds in large numbers. The larvæ are translucent and remain quietly among the *Lemna* and other aquatic vegetation, thus escaping the observation of the fish that frequent the water.

Southern California.

San Onofre, June 27, 1906 (H. G. Dyar); Nigger Slough, Gardena, May 30, 1906 (H. G. Dyar); Sweetwater Junction, June 2, 1906 (Dyar & Caudell); Guadaloupe, June 25, 1906 (A. N. Caudell); Salinas, July, 1906 (H. G. Dyar).

CULEX DELYS, new species.

DESCRIPTION OF FEMALE OF CULEX DELYS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long and slender, scarcely expanded toward tip, labellæ conically tapered; vestiture black, paler beneath, labellæ pale, with small outstanding setæ. Palpi short, one-sixth as long as proboscis, blackish brown. Antennæ rather long, the second joint half as long again as third, remainder of joints subequal, rugose, pilose, black; hairs of the whorls moderate, black; tori subspherical, with a cup-shaped apical excavation, luteous brown, darker on inner side. Clypeus rounded triangular, blackish, nude. Eyes black. Occiput black, clothed with narrow, curved scales, pale brown above, white below with numerous erect, forked light brown ones on nape, margins of eyes whitish scaled; a row of coarse brown bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with pale scales and dark bristles. Mesonotum dark brown, vestiture of narrow, curved pale golden-brown scales with a slight bronzy luster, and stiff brown bristles. Scutellum trilobate with vestiture similar to that of mesonotum but paler, each lobe with a tuft of dark brown bristles. Postnotum elliptical, prominent, luteous brown, nude. Pleuræ brown, coxæ luteous, with patches of white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of dull black scales, a row of lateral, basal, segmental, white, triangular patches; venter with segments black, white banded basally, tip with numerous bristles.

Wings moderate, hyaline; petiole of second marginal cell very short, about one-eighth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; outstanding scales of veins narrowly ovate, denser and broader on forks of second vein, brown, with a blue reflection on costa.

Legs moderate, femora whitish beneath; tibiæ and tarsi black with a slight bronzy reflection, paler beneath, knees and tips of tibiæ whitish. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Type: No. 12706, U. S. Nat. Mus.

Mr. Jennings bred the unique type from a larva in a swampy pond in bamboo woods but preserved no larval skin.

Panama.

Tabernilla, Canal Zone, December 15, 1908 (A. H. Jennings).

Digitized by Google

We have described *Culex delys* from a single adult without knowing the larva, since it seems so distinct. The character of narrow scales on the occiput is very unusual in the species with which it groups on other characters. Of such species only *Culex melanurus* possesses similar scales but is otherwise not allied to the present form.

CULEX PECCATOR Dyar & Knab.

Culex peccator Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 256, 1909.
Culex peccator Thibault, Proc. Ent. Soc. Wash., xii, 20, 1910.

ORIGINAL DESCRIPTION OF CULEX PECCATOR:

Proboscis rather long and slender, very slightly enlarged towards the apex, black-scaled; palpi short, black. Occiput clothed with broad, flat, bronzy black scales. Mesonotum clothed with bronzy black scales. Abdomen subcylindrical, truncate at the tip, clothed above with dull black scales; a row of white lateral triangular basal segmental spots; venter whitish, the last two segments with dark apical bands. Wings with the outstanding scales of the veins dense, spatulate on the forks of the second and fourth veins and on the third vein. Legs dark-scaled, the femora pale beneath. Length, 3 mm.

Eleven specimens, Scott, Lonoke County, Arkansas, September 30 to October 8, 1908 (J. K. Thibault, jr.).

Type no. 12192, U. S. N. M.

DESCRIPTION OF FEMALE AND MALE OF CULEX PECCATOR (LARVA UNKNOWN):

Female.—Proboscis rather long and slender, somewhat expanded towards tip, labellæ conically tapered; vestiture black, paler beneath, labellæ pale, with small outstanding setæ. Palpi short, one-sixth as long as proboscis, blackish brown. Antennæ moderate, joints subequal, rugose, pilose, black, hairs of whorls sparse, moderate, black; tori subspherical with a cup-shaped apical excavation, luteous brown, darker on inner side. Clypeus rounded triangular, blackish, nude. Eyes black. Occiput black, clothed with narrow, curved, pale bronzy scales on nape, flat ones over sides to vertex, blackish brown above, white below, and numerous erect, forked black ones on vertex; margins of eyes dark scaled; a row of coarse black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with pale scales and dark bristles. Mesonotum dark brown, vestiture of lanceolate dark-brown scales with a slight bronzy luster and stiff brown bristles. Scutellum trilobate with vestiture similar to that of mesonotum, each lobe with a tuft of dark brown bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ brown, coxæ luteous, with patches of white scales and rows of pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of dull-black scales, a row of lateral basal segmental yellowish-white triangular spots; venter yellowish-white scaled, last segment blackish; hind margins of segments with yellowish hairs, the end with numerous bristles.

Wings moderate, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; outstanding scales of veins narrowly ovate, denser and broader on forks of second and fourth veins and apical half of third, brown with blue reflection on costa.

Legs moderate, femora whitish beneath; tibiæ and tarsi black with a slight bronzy reflection, paler beneath, tips of tibiæ black. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis long, straight, very slightly swollen towards apex, bronzy black. Palpi exceeding the proboscis by the length of the last joint, slender; last two joints with a few fine black hairs; vestiture entirely of blackish scales. Antennæ rather long, plumose; last two joints long, the last one slightly swollen, rugose, pilose, black, the others rather short, whitish, with black rings at insertions of hair-whorls; hairs long, dense, black. Coloration similar to the

Digitized by Google

female. Abdomen long, slender, enlarged towards apex, eighth segment lobed beneath; without distinct lateral pale spots; ciliation long, coarse, not arranged in distinct lateral series, most abundant towards tip. Wings slightly narrower than in the female, the venation nearly the same, the outstanding scales more broadly ovate. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 10, fig. 67): Side-pieces as long as wide, subspherical, with excavated base; lateral prominence divided, outer limb conical, bearing a rod with sharply hooked tip, a large rounded leaf-like appendage and two coarse setæ; inner limb divided, each part bearing a filament with hooked tip, inner branch very short. Clasp-filament large, stout, constricted near basal third, apex enlarged, cleft, hirsute without and bearing a terminal claw and spine. Harpes with inner limb long, slender, tip bent and forming fine comb. Harpagones divided, the longest plate narrow, curved, expanded and excavated at its tip. Basal appendages small, elliptical, hairy. Penultimate segment emarginate and thickened beneath.

Mr. Thibault wrote us:

"I know nothing of their habits, except that all of my specimens were taken in tree-holes and holes in the bank of a bayou here. I took a single male in a buggy along with many *Anopheles quadrimaculatus* and *Culex abominator*. Among thousands of *Culex abominator* taken at dusk along a bayou where *Culex peccator* was known to occur, I did not get a single specimen. In the tree-holes I took mostly males, and I can not say for such that *peccator* bites." In his published account he says: "Found in hollow trees and caves. Abundant in such places, though seldom taken elsewhere. They do not seem to enter houses or bite. I have been unable to find where they breed or secure larvæ. Taken from June to October."

Gulf States of North America.

Scott, Arkansas, September and October, 1908 (J. K. Thibault, Jr.); Scott, Pulaski County, Arkansas, August 11, 1909 (J. K. Thibault, Jr.).

CULEX HESITATOR Dyar & Knab.

Culex hesitator Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 205, 1907.
Culex hesitator Busck, Smiths. Misc. Colls., quart. iss., lii, 69, 1908.
Culex hesitator Theobald, Mon. Culic., v, 615, 1910.

ORIGINAL DESCRIPTION OF CULEX HESITATOR:

♀.—Proboscis moderately long, very slightly broadened towards apex, black scaled; palpi short, black; occiput clothed with recumbent whitish scales and with erect black forked ones; mesonotum uniformly rich brown with slight bronzy luster; pleura very pale brownish with an indistinct dark longitudinal shade; metanotum pale grayish brown; abdomen depressed, truncate at the tip, black scaled above with coppery and greenish luster, marginal hairs of the segments pale yellow, lateral white basal spots present, those on the terminal segments largest, venter black, with distinct white basal bands; legs dark with bronzy luster; wing-veins uniformly brown scaled; claws simple. Length, 3 mm.

♂.—Palpi much longer than the proboscis, the last two segments projecting beyond it, brown scaled, not ringed; antennæ densely plumose; abdomen with basal silvery-white bands above, broadest on the fourth and fifth segments and much prolonged on the sides on the sixth and seventh segments. Length, 3.5 mm.

Seven specimens, Las Cacadas, Canal Zone, Panama (August Busck, collector), bred from pupæ captured in a small swampy stream.

***Type*.—No. 10872, U. S. National Museum.**

Allied to *Culex extricator* Dyar and Knab, but the banding of the abdomen beneath differs.

DESCRIPTION OF FEMALE AND MALE OF CULEX HESITATOR (LARVA UNKNOWN):

Female.—Proboscis moderately stout, somewhat expanded towards tip, labellæ conically tapered; vestiture black with a blue reflection, the labellæ paler with small outstanding setæ. Palpi short, one-fifth as long as proboscis,

Digitized by Google

blackish brown. Antennæ moderate; joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, dark brown. Clypeus rounded triangular, dark brown, nude. Eyes black. Occiput black, clothed with narrow, curved pale-bronzy scales narrowly on the nape, flat ones well up the sides, pale brown above, white below, and numerous erect, forked black ones on vertex; margins of eyes white scaled.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with pale scales and dark bristles. Mesonotum dark brown, with two narrow impressed bare lines; vestiture of narrow, curved golden-brown scales and stiff dark-brown bristles. Scutellum trilobate, with similar but slightly paler vestiture to mesonotum, each lobe with a tuft of dark-brown bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ brown, with dark spots, coxæ luteous, with patches of white scales and rows of pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of brown-black scales with a slight bluish reflection, a row of lateral segmental basal yellowish-white triangular spots; venter yellowish-white scaled, tips of the segments blackish; hind margins of segments with yellowish hairs; end with numerous bristles.

Wings moderate, hyaline; petiole of second marginal cell about one-fifth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; outstanding scales of veins elliptical, especially towards apex, denser on second, third, and fourth veins, brown, with a blue reflection on costa.

Legs moderate, femora whitish beneath; tibiæ and tarsi black with a bronzy reflection, paler beneath; tips of tibiæ black. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis long, straight, swollen towards apex, bronzy black. Palpi exceeding proboscis by length of last two joints, slightly enlarged towards apex, end of the long joint and the last two joints with long, dense, black hairs, vestiture of bronzy-brown scales, penultimate joint with a patch of white scales at base beneath. Antennæ rather long, plumose; last two joints long and slender, rugose, pilose, black, others short, whitish, with black rings at insertions of hair-whorls; hairs long, dense, black. Coloration similar to the female. Abdomen elongate, depressed, somewhat expanded towards apex; dorsum with broad silvery white basal segmental bands, narrower on sixth and seventh and laterally expanded, eighth with lateral spots; lateral ciliation ample, brown. Wings slightly narrower than in the female, venation nearly the same. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 11, fig. 79): Side-pieces over twice as long as wide, stout, rounded at tips; inner process divided, outer part columnar, bearing three notched and distorted filaments; inner part widely furcate, each part slender and bearing a long filament with expanded bent tip; clasp-filament with base slender and curved, tip expanded into a large rounded knob with a central groove, outer margin bearing a row of curved spines, terminal claw scarcely differentiated from them; a minute setæ on inner side. Harpes divided, inner limb long, slender, bearing a comb of spines at tip, outer also long, slender, curved at end. Harpagones divided into several lamellæ, inner one doubly expanded at tip and angled. Unci forming a small basal cone. Basal appendages very narrow, approximate, oblique, setose.

The larvæ live in the edges of streams and similar locations. Mr. Busck got his specimens from a small swampy stream, but all had pupated, so no larvæ were observed.

Panama.

Las Cascadas, Canal Zone, May 18, 1907 (A. Busck).

Digitized by Google

CULEX APATETICUS, new species.

DESCRIPTION OF FEMALE AND MALE OF CULEX APATETICUS (LARVA UNKNOWN):

Female.—Proboscis moderately stout, somewhat expanded towards tip, labellæ conically tapered; vestiture black with a blue reflection, labellæ paler with small outstanding setæ. Palpi short, one-fifth as long as proboscis, blackish brown. Antennæ moderate, joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, dark brown. Clypeus rounded triangular, dark brown, nude. Eyes black. Occiput black, narrowly clothed on nape with narrow, curved pale-bronzy scales, flat ones well up sides, pale brown above, white below, and numerous erect, forked black ones on vertex; margins of eyes white scaled.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with pale scales and dark bristles. Mesonotum dark brown with two narrow impressed bare lines; vestiture of narrow, curved golden-brown scales and stiff dark-brown bristles. Scutellum trilobate, with vestiture similar to but slightly paler than mesonotum, each lobe with a tuft of dark-brown bristles. Postnotum elliptical, prominent dark brown, nude. Pleuræ brown with dark spots, coxæ luteous, with patches of white scales and rows of pale bristles.

Abdomen subcylindrical, depressed, truncate at the tip; dorsal vestiture of brownish-black scales with a slight bluish reflection, a row of lateral segmental basal yellowish-white triangular spots; venter yellowish-white scaled, tips of segments blackish; hind margins of segments with yellowish hairs; end with numerous bristles.

Wings moderate, hyaline; petiole of second marginal cell about one-seventh as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; outstanding scales of veins elliptical, especially towards apex, denser on second to fourth veins, brown, with a blue reflection on costa.

Legs moderate, femora whitish beneath; tibiæ and tarsi black with bronzy reflection, paler beneath, tips of tibiæ black. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.7 mm.

Male.—Proboscis long, straight, swollen towards apex, bronzy black. Palpi exceeding proboscis by length of last two joints, slightly enlarged towards apex, end of long joint and last two joints with long, dense, black hairs; vestiture of bronzy-brown scales, penultimate joint with patch of white scales at base beneath. Antennæ rather long, plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertion of hair-whorls; hairs long, dense, black. Coloration similar to the female. Abdomen elongate, depressed; segments beyond second dorsally with whitish bands at their bases, narrower on sixth and seventh segments and expanded laterally, second and eighth with lateral spots; lateral ciliation ample, brown. Wings slightly narrower than in the female; venation nearly the same. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 13, fig. 91): Side-pieces over twice as long as wide, stout, rounded at tips, outer process columnar, bearing several distorted filaments and a lanceolate one; inner process divided, widely furcate, each limb bearing a long filament with expanded bent tip; clasp-filament with base slender and curved, the tip narrowly foot-shaped, slightly serrate without, tip claw-like and with terminal inserted spine forming a double tip. Harpes divided, inner limb long, slender, bearing a comb of spines at its tip; harpagones divided into several lamellæ, mostly slender and spatulate. Unci forming a small basal cone. Basal appendages narrow, approximate, oblique, setose.

Type: No. 12707, U. S. Nat. Mus.

Digitized by Google

The larvæ live in ground pools. Mr. Jennings got them in a swampy pond in bamboo woods and in holes in rocks, in the latter case associated with *Anopheles eiseni*.

Panama.

Tabernilla, Canal Zone, December 12, 1908 (A. H. Jennings); Upper Pequini River, March 27, 1909 (A. H. Jennings).

CULEX NIGRICORPUS (Theobald).

Aëdes nigricorpus Theobald, Mon. Culicid., ii, 231, 1901.
Ædes nigricorpus Giles, Gnats or Mosq., 2 ed., 482, 1902.
Verrallina nigricorpus Theobald, Mon. Culic., iii, 295, 1903.
Verrallina nigricorpus Blanchard, Les Moustiques, 417, 1905.
Ædes (?) *nigricorpus* Theobald, Gen. Ins., Dipt., fasc. 26, 35, 1905.
Isostomyia (?) *nigricorpus* Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 24, 1906.
Verrallina nigricorpus Peryassú, Os Culic. do Brazil, 254, 1908.
Verrallina nigricorpus Theobald, Mon. Culic., v, 495, 1910.

ORIGINAL DESCRIPTION OF AËDES NIGRICORPUS:

Thorax black, with deep bronsy-black curved scales; abdomen black, with white lateral spots and white ventral bands; legs black; ungues of the ♀ equal and simple; wings smoky, with deep brown scales; stem of the first sub-marginal cell short.

♀. Head black, clothed with flat dusky scales over the occiput and pale smoky-grey ones at the sides, with numerous black upright forked scales and long black bristles; eyes black and silvery; palpi short, dark brownish-black; antennæ black, basal joint black, testaceous inside; proboscis and clypeus black.

Thorax black, densely clothed with a felting of a narrow curved bronsy-black scales and two rows of black bristles and numerous black bristles over the roots of the wings; pleuræ dark brown, with a few indistinct patches of grey scales; scutellum brown, with narrow curved bronsy scales and black "border-bristles."

Abdomen black, clothed with deep fuscous-brown scales, each segment with basal, lateral, white spots and brown posterior "border-bristles"; first segment black, with numerous long black bristles; venter black, with basal white scaled bands.

Legs black scaled; femora, especially of the fore legs, rather thick and bristly; coxæ pale brown; ungues equal and simple.

Wings smoky brown; veins densely brown scaled; long scales on the stems of the second and fourth long veins; scales on both branches of the fork-cells and the third long vein dense, short and rather thick; first sub-marginal cell long, about five times the length of its stem, its base much nearer the base of the wing than that of the second posterior cell; stem of the latter equal to about two-thirds the length of the cell; posterior cross-vein about twice its own length distant from the mid cross-vein.

Halteres with pale ochraceous stem and fuscous knob and part of the stem.

Length.—2 to 3 mm.

Habitat.—Itacoatiara, Lower Amazon (Austen) (96, 80).

Time of capture.—February.

Observations.—A small black species very like *Ae. Butleri*, mihi, but differing from it in two respects:—

(i) The fork-cells are relatively very much longer than in *Ae. Butleri*, in which the stem of the first sub-marginal cell is more than half the length of the cell, whereas in this species the stem is short;

(ii) There are numerous upright forked scales on the head, which do not appear to exist in *Ae. Butleri*.

Unless these two characters are looked for the species may easily be confounded, in spite of their widely separate habitats.

DESCRIPTION OF AËDES NIGRICORPUS BY GILES:

Veins of wing very densely clothed with uniformly black, long scales; anterior fork-cell three and a half times as long as its stem, the latter much shorter than the stem of the shorter and wider posterior fork-cell, which is, however, nearly twice as long as its stem. Tarsi uniformly black. Thorax clothed with narrow curved, black scales, on a black ground. Abdomen, seen from above, uniformly black, but with small white lateral spots.

♀.—The uniformly sooty tint of this species leaves little room for description. Seen from above it is entirely so, with the exception of a few white scales on the

Digitized by Google

apices of the femora. The venter, however, has broad white basal bands. May be distinguished from the preceding species by the much greater length of the anterior fork-cell as compared with its stem, and in having some upright forked cells on the head which are absent in *Æ. Butleri*. *Length*.—About 2.8 mm.

Habitat.—Described from a single, very well preserved ♀ specimen, sent me by Dr. Gray, of St. Lucia, West Indies; the disc marked "St. Glivan, Castries." Also recorded from the Lower Amazon.

There are no specimens of this species in the collection of the U. S. National Museum.

The male, the larva and the life history and habits are unknown.

Itacoatiara, Lower Amazon (Theobald); St. Lucia, West Indies (Giles).

Colonel Giles records this species from our region on the strength of a single female specimen received from Santa Lucia. We think it very doubtful that the identification of this specimen is correct, as we have few species with such a wide distribution, our species from the West Indian Islands being generally distinct from those of the mainland. Colonel Giles's brief description appears to agree with Theobald's more detailed one, yet neither is sufficiently detailed to enable us to place the species in our table. The species seems allied to our *Culex hesitator*, with a uniform proboscis in the female and long palpi in the male, and we suspect that *Culex nigricorpus* will be found to have long palpi in the male, when that sex is discovered, in spite of the species having been described as an *Aëdes*. We have, unfortunately, no material from the island of Santa Lucia. From analogy, we judge that its species will prove largely endemic; the present species will prove distinct from, though allied to the *Culex nigricorpus* from the lower Amazon and to *Culex hesitator* from Panama. Theobald later referred his *Aëdes nigricorpus* to his genus *Verrallina* which seems to be illy founded. The type species of *Verrallina* is the East Indian *Verrallina butleri*, which Edwards has recently shown to belong to the genus *Aëdes* in the restricted sense (Bull. Ent. Res., iv, 229, 1913).

CULEX INVOCATOR Pazos.

Culex invocator Pazos, Anal. Acad. Cien. méd. fís. y nat. de la Habana, xlv, 426, 1908.
Culex invocator Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 258, 1909.
Culex invocator Pazos, Sanidad y Ben., ii, 50, 561, 1909.

ORIGINAL DESCRIPTION OF CULEX INVOCATOR:

Catálogo numérico. Núms. 364, 556, 277, 311 y 308.
Nombre vulgar: Mosquito.
Sinonimia.
Diagnosis: Long. tot. incluyendo la trompa m. m. 5'75.

Cabeza: negra, nuca ocupada por horquillas azabache, frente, con dos cerdas en anteversión, ojos ribeteados por cerdas equidistantes, negras. Clipeus desnudo. Ojos, color negro. Antenas morenas, no están anilladas de colores, de la misma longitud que la trompa, no son plumosas. Palpos negros, ocupan un quinto de la longitud de la trompa no tiene anillos coloreados.

Tórax: castaño obscuro, de m. m. 1'75 de long., por su parte posterior próximo al escutellum cerdas negras, flancos castaño obscuro, no tiene manchas. Escutellum: con escamas en haz doradas, los lóbulos presentan entre otras cerdas, cuatro notables en el centro y tres para los laterales. Metanotum: negro lustroso. Alas transparente, ligeramemte ahumadas, no tienen manchas ni en el borde costal ni en las nervuras, franjas ahumada obscura. Las escamas que revisten las nervuras muy finas y alargadas m. m. 3'0 para el ala. Balancines: moreno con pedículo claro. Patas morenas.

Abdomen: castaño obscuro, como truncado posteriormente, no tiene ni manchas ni bandas claras ni obscuras. Tiene manchas prolongadas sobre los costados de los segmentos, claras, color crema, pequeñas, características. Long. m. m. 2'50.

Nada sabemos sobre su vida, desconocemos la larva. Capturado en esta villa.

DESCRIPTION OF FEMALE AND MALE OF CULEX INVOCATOR (LARVA UNKNOWN):

Female.—Proboscis moderate, uniform, labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstand-

Digitized by Google

ing. Palpi short, one-fifth as long as proboscis, slender, black with a few outstanding setæ. Antennæ with the joints subequal, rugose, pilose, black, second joint slightly thickened, pale at base; tori subspherical with a cup-shaped apical excavation, dark brown, black within; hairs of whorls sparse, moderate, black. Clypeus rounded in front, constricted at base, black, nude. Eyes black. Occiput black, clothed with broad, flat black scales with bronzy luster, a small area of narrow curved one along median line; a patch of dull whitish scales well down sides; many erect, forked black scales with a bronzy luster on vertex; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, black, vestiture of black bristles. Mesonotum blackish brown; vestiture of dense, large, narrow, curved dark-brown scales and rows of coarse black bristles. Scutellum trilobate, blackish, clothed with scales similar to those on mesonotum, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ dark brown with patches of flat whitish scales and rows of black bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black, a row of small lateral triangular basal segmental white spots; venter black scaled, with distinct but narrow white, basal segmental bands; tips of segments with golden-brown bristles.

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein nearly twice its own length distant from anterior cross-vein; scales brownish black, outstanding ones dense on outer part of wing, narrowly ovate and denser on forks of second and fourth veins and outer half of third, others narrowly ligulate.

Legs moderate; vestiture black, femora pale beneath; knees dark. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis straight, long and slender, gradually and slightly enlarged towards apex, black scaled. Palpi slender, exceeding the proboscis by much more than the length of the last joint; apex of long joint and last two joints somewhat thickened and clothed with numerous long black hairs; vestiture black. Antennæ rather sparsely plumose; last two joints long and slender, rugose, pilose, black, the others short, pale brown, with thick black rings at insertions of hair-whorls; hairs of whorls long, dense, dark brown. Coloration similar to the female. Abdomen long, somewhat expanded towards apex, lateral spots visible dorsally on sixth and seventh segments, ciliation of coarse, black hairs, not arranged in distinct lateral series; tip of abdomen densely bristly. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Genitalia (plate 12, fig. 81): Side-pieces over twice as long as wide, tips conically rounded; inner process divided, the two portions separated at base, but approximate; outer portion slender, furcate, longer outer branch bearing a leaf-like appendage, inner two filaments with curved tips; inner portion stout, minutely pilose, bearing a filament with expanded tip at its apex, and another from a short branch on inner side about middle. Clasp-filament short, stout, attenuated in middle, with a stout, short terminal claw and two stout retrose spines below tip. Harpes divided, inner branch long and slender, bent at its tip and bearing a row of pecten teeth; inner branch short and curved. Harpagones lamellate, divided into two or more plates, their corners forming projecting angles. Basal appendages large, flat, oblique, with numerous fine hairs.

Life history and habits unknown.

Cuba.

San Antonio de los Baños (J. H. Pazos).

Digitized by Google

Dr. Pazos described this species under our determination, but his description happened to appear first, so that it is necessary to credit him with the authorship of the name.

CULEX EXTRICATOR Dyar & Knab.

Culex extricator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 211, 1906.
Culex extricator Busck, Smiths. Misc. Colls., quart. iss., iii, 68, 1908.
Culex extricator Knab, Science, n. s., xxxi, 868, 1910.

ORIGINAL DESCRIPTION OF CULEX EXTRICATOR:

The antennal tuft arises near the middle, but has a distinct notch; the head hairs are in threes or fours; air tube much tapered on outer half, the tufts weak; body shortly hairy, the spicules not much elongated. The lateral hairs are in twos after the second abdominal segment. Lateral comb of the eighth segment well developed. Anal gills bluntly rounded.

Collected by Mr. Busck in a bucket used to keep live crabs at Cedros, Trinidad. The adults were named "*Culex pipiens* L." by Mr. Coquillett.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with three paired tufts posteriorly outwardly, the middle one moved laterad out of line, usually situated near or not much beyond the middle of the tube	9
9.	Body spicular or pilose	10
10.	Dislocated tuft of tube not, or scarcely beyond the middle	11
11.	Anal processes broad and bluntly rounded	12
12.	Air tube subfusiform, tapered on outer half; body spicular.	*extricator*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX EXTRICATOR:

Female.—Proboscis moderate, subcylindrical, slightly expanded at tip, labellæ conically tapered; vestiture black with bronzy and blue luster; setæ minute, curved black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, slender, black with a bluish reflection, with a few outstanding setæ. Antennæ with basal joint somewhat shorter than apical ones, rugose, densely pilose, dark brown; tori subspherical with cup-shaped apical excavation, luteous, black within; hairs of the whorls sparse, moderate, black. Clypeus roundedly triangular, doubly excavated at base, pale brown, nude. Eyes black. Occiput brown with narrow, curved, lustrous pale-brown scales, narrowly whitish along margins of eyes and flat ones on lower part of sides, many erect, forked black scales on vertex; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, brown, the vestiture of pale scales and brown bristles. Mesonotum light brown, with two dorsal impressed bare concolorous lines; vestiture of narrow, curved, lustrous reddish-brown scales and rows of coarse dark bristles. Scutellum trilobate, pale brown, clothed with narrow, curved pale scales, each lobe with a tuft of coarse brown bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ luteous brown, coxæ greenish luteous with patches of white scales and rows of pale bristles.

Abdomen subcylindrical, truncated at tip; dorsal vestiture dark brown with a blue-black reflection; last segment with a narrow white, basal band; a row of pale bristles at tip of each segment; a row of small lateral basal segmental whitish triangular patches becoming large on apical segments; venter dirty-white scaled with black, somewhat angular, bands at tips of last three segments.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein nearly twice its own length distant from the anterior cross-vein; scales brown

Digitized by Google

with a blue luster on costal edge, outstanding ones moderately dense, broadly linear, those on forks of second and fourth veins much denser.

Legs moderate, rather slender, femora whitish beneath nearly to tip; tibiæ and tarsi brown with a bluish reflection and pale-bronzy luster beneath; knees dark. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.5 mm.

Male.—Proboscis straight, rather stout, slightly and gradually enlarged towards apex, bronzy-brown scaled. Palpi very slender, hardly enlarged apically, exceeding the proboscis by more than the length of the last joint; tip of long joint and last two joints sparsely clothed with moderate black hairs; vestiture entirely of bronzy brown scales. Antennæ with the last two joints long and slender, rugose, pilose, black, the others short, but longer than usual; hairs of whorls long, blackish, dense, but appearing less plumose, as the shaft is rather long and slender. Coloration similar to the female. Wings slightly narrower than in the female, the fork-cells about the same, vestiture also similar. Abdomen elongate, depressed; lateral spots very large and tending to form bands, second, third, and last segments with dirty-whitish basal bands, that on last segment expanded laterally; hairs at ends of segments coarse, brown, tip with numerous coarse long bristles; no lateral ciliation. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Genitalia (plate 13, fig. 89): Side-pieces over twice as long as wide, tip narrowly conically tapered; outer lobe divided into two portions, both stout and narrowly quadrate at their tips, somewhat widely divaricate; outer lobe with a leaf-like appendage and a seta, inner lobe with three rods with hooked tips. Clasp-filament long, attenuated in middle, a stout subapical inserted claw and two minute setæ below. Harpes divided, inner limb rounded and crowned with dense, stout spines, outer limb long, blade-like, strongly curved. Harpagones divided into a number of plates, a broad, rounded inner one obscuring basal portions, apical ones projecting as long stout teeth.

Larva, Stage IV (plate 96, fig. 312).—Head rounded, widest through eyes, bulging at sides, a notch at insertion of antennæ, front margin arcuate. Antennæ large, basal two-thirds thick, spined; a large tuft at the outer third from a notch; two long setæ subapically, a long seta, a short one and a digit at tip. Head-hairs in fours, ante-antennal tufts multiple. Mental plate triangular, oblique on sides, a large central tooth and ten on each side, basal ones a little more remotely spaced, last one small. Mandible quadrangular; three filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of transverse rounded prominences on outer margin each bearing a hair and a tuft of short ones; dentition of four teeth on a process, first longest; a spine before, a small tooth and a large trifid one at base, a long serrate filament and a row of feathered hairs within; process below long, curved with a longitudinal and a transverse row of hairs, a tuft at tip of each limb; basal angle moderate with a row of stout hairs within; a short row of hairs at base. Maxilla elongate-conical, divided by a suture; inner half with a row of long hairs on margin, some of the basal ones slightly feathered, two rows of cilia within; a row of long hairs at tip running down along the suture; outer half with two filaments below the middle, a spine on outer side and some irregular points on margin. Palpus small, slender with four irregular apical digits. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter; skin shortly pilose; lateral hairs multiple on first abdominal segment, triple on second, in twos on third to sixth. Air-tube gradually tapered, more strongly on outer half, nearly five times as long as wide; pecten evenly spaced, running to basal third; single tooth broad with from two to four basal branches; three hair tufts on posterior margin, the middle one out of line and beyond middle of tube. Lateral comb of eighth seg-

Digitized by Google

ment of many spines in a triangular patch; single spine elongate, widened outwardly, fringed with spinules around tip. Anal segment as long as wide, ringed by the plate; dorsal tuft a group of long hairs on each side; a single lateral hair; ventral brush well developed, confined to the barred area; anal gills a little longer than segment, rather broad and rounded, showing a slight central trachea.

The larvæ live in the water in the holes of certain species of crabs along the sea-shore. Our collectors have found them in such situations and Mr. Busck obtained the type-material from a bucket used to keep living crabs. He later observed the species in its natural habitat and says:

"The larvæ of this species were taken in crab-holes, and the species is clearly closely associated with these crabs, the adults remaining in the holes during day time, like those of the genus *Deinocerites*. A large series was bred, but neither adults nor larvæ were obtained in other localities."

The adults apparently do not suck blood. Concerning the relation of these insects to their hosts, Mr. Busck tells us that the larvæ and adults are found in holes actually inhabitated by the crabs. Generally each crab has its own hole; but it is difficult to find an untenanted hole, for if the owner dies, another crab takes his place. These holes are deep, often several feet, with water in the bottom. The crab fits closely into the hole, although on account of its flattened shape there is some space above and below the crustacean, the hole being circular. The crabs rush to their holes with great rapidity, but once within descend more slowly, on account of the narrowness of the hole. The adult mosquitoes rest within the holes, and fly out on the approach of the crab, being doubtless continually alert for its advent. The larvæ find abundant nourishment in the water in the bottom of the hole, enriched by the excrement of the crab. They seek the bottom when disturbed, and in this way avoid harm while the crustacean is in his domicile. Some of the females before us have the abdomen distended with food and of a pale amber color, showing that the food was not vertebrate blood.

Trinidad to Central America, probably all along the northern coast of South America.

Cedros, Trinidad, June 23, 1905 (A. Busck); Colon, Panama, July 20, 1907, associated with *Deinocerites melanophylum* and *Dinomimetes epitedeus* (A. Busck); Caldera Island, Porto Bello Bay, Panama, January 19, 1908, associated with *Dinomimetes epitedeus* (A. H. Jennings); Caldera Island, April 11, 1908, adults taken in crab-holes (A. H. Jennings); Ancon, Canal Zone, Panama, August 9, 1908 (A. H. Jennings); Port Limon, Costa Rica, September 24, 1905, adults taken at crab-holes (F. Knab).

CULEX EQUIVOCATOR Dyar & Knab.

Culex equivocator Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 203, 1907.
Culex equivocator Busck, Smiths. Misc. Colls., quart. iss., iii, 67, 1908.
Culex equivocator Theobald, Mon. Culic., v, 614, 1910.

ORIGINAL DESCRIPTION OF CULEX EQUIVOCATOR:

♀.—**Proboscis rather long and slender, very slightly enlarged towards the apex, black scaled; palpi short, black scaled; occiput brown scaled with bronzy luster, the ocular margin very narrowly white scaled; mesonotum uniformly rich brown scaled with bronzy luster; metanotum light brownish; abdomen depressed, truncate at the tip, clothed above with brownish-black scales with faint bluish luster, the segments with lateral white triangular basal spots, most distinct on segments 5, 6 and 7, beneath black, the bases of the segments with broad soiled white bands; legs dark with bronzy luster; claws equal and simple; scales of the wing-veins brown, long and narrow throughout. Length, 3.5 mm.**

♂.—**Palpi longer than the proboscis, the two terminal segments with long hairs, entirely clothed with deep-brown scales, without pale rings; abdomen with narrow**

Digitized by Google

white basal segmental bands above, the eighth segment entirely white scaled. Length, 3.5 mm.

Eight specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in water in bamboo joints.

Type.—No. 10873, U. S. National Museum.

Allied to *C. hesitator* D. & K., described below, but differing in the shape of the wing-scales.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX EQUIVOCATOR:

Female.—Proboscis long and slender, somewhat enlarged towards apex, labellæ conically tapered; vestiture black with a bronzy and blue reflection, labellæ pale with small outstanding setæ. Palpi short, one-fifth as long as proboscis, blackish brown. Antennæ moderate; joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black; tori subspherical with a cup-shaped apical excavation, yellowish brown. Clypeus rounded triangular, dark brown, nude. Eyes black. Occiput black, clothed with narrow, curved bronzy-brown scales on vertex, flat whitish ones on lower part of sides, and numerous erect, forked black ones on vertex, margin of eyes silvery-white scaled.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with pale scales and dark bristles. Mesonotum dark brown with two narrow impressed bare lines; vestiture of narrow, curved golden-brown scales and stiff dark-brown bristles. Scutellum trilobate, with similar but paler vestiture to mesonotum, each lobe with a tuft of dark-brown bristles. Postnotum elliptical, prominent, dark brown, pruinose, nude. Pleuræ greenish luteous, coxæ luteous, a few narrow, elliptical white scales and pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of brown-black scales with a slight bronzy reflection, the second segment with a narrow, transverse yellowish-white basal band; a row of lateral segmental basal yellowish-white triangular spots; venter yellowish-white scaled, tips of segments blackish, with yellowish hairs.

Wings ample, hyaline; petiole of second marginal cell less than one-fourth as long as its cell, that of second posterior cell much shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins long, dense, the outstanding ones broadly linear, brown, with blue reflection on costa, densest on forks of second and fourth veins and apical half of third. Halteres whitish, with black knobs.

Legs moderate, femora whitish beneath except at tip; tibiæ and tarsi black, tarsi with a bronzy and blue reflection, paler beneath, tips of tibiæ whitish; a patch of white scales at base of first hind tarsal joint. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3.5 mm.

Male.—Proboscis straight, slightly and gradually enlarged apically. Palpi exceeding proboscis by nearly the length of last joint, slightly enlarged towards apex, end of long joint and the last two joints with long, dense black hairs; vestiture of bronzy scales, without annulations. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls; hairs long, dense, black. Coloration similar to the female. Wings much narrower, the stems of the fork-cells longer. Abdomen long, slender, somewhat widened towards apex; segments dorsally with narrow whitish bands at their bases, last segment entirely pale scaled; tip with numerous coarse bristles; lateral ciliation coarse, rather sparse. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 15, fig. 106): Side-pieces over twice as long as wide, tips bluntly conical; inner lobe at outer third, stout, quadrate, bearing a leaf-like appendage, three rods and a stout seta; clasp filament stout, curved, slightly larger at base, with a stout, short terminal claw. Harpes divided, inner limb

Digitized by Google

stout, rounded, with a crown of dense spines; outer limb slender, curved, blade-like. Harpagones divided into a number of lamellæ, the angles of which project as stout teeth. Basal appendages approximate, rounded, bearing several stout setæ.

Larva, Stage IV (plate 96, fig. 311).—Head rounded, widest through eyes, somewhat broader than long; antennæ long, stout, a large tuft at outer third, the part beyond slender, the shaft spinose; upper pair of dorsal head-hairs in fours, lower in threes, both long, ante-antennal tufts multiple. Skin of body very minutely spiculate, the lateral hairs in fives on first abdominal segment, in threes on second, in twos on third to sixth; lateral comb of eighth segment of many spines in a large transverse patch. Air-tube six times as long as wide, slightly tapering outwardly; pecten of short teeth, evenly spaced, reaching basal two-fifths; three tufts on tube, the basal one of three hairs well beyond end of pecten, the outer two two-haired, the middle one moved laterally out of line and situated slightly beyond middle of tube; terminal hooks minute. Anal segment about as long as wide, ringed by the plate, which is slightly spinose along its posterior border; dorsal tuft of four hairs of different lengths on each side; lateral hair small, single; ventral brush large, confined by the chitinous ring. Anal gills about twice as long as the segment, tapering, rather sharply pointed.

The larvæ live in rain-water collected in bamboo-joints and in dirty ground-puddles. Mr. Busck found them in bamboo-joints on six occasions, once in water in a hole in a cut banana-stem, once in the crotch of a tree 8 feet from the ground, once in an old barrel and once in foul, dark water in a swamp; Mr. Jennings found them in old tins, in a cistern in an old fort, in bamboo-traps, in a hole in a rock along a stream, and in a pool in a ground-cut.

Panama.

Tabernilla, Canal Zone, May 9, 16, 21, June 4, July 18, 1907 (A. Busck); December 22, 1908, April 14, 1909 (A. H. Jennings); Pedro Miguel, Canal Zone, May 16, 1907 (A. Busck); Ahorca Lagarto, Canal Zone, June 12, 1907 (A. Busck); Lion Hill, Canal Zone, July 26, 1907 (A. Busck); Bas Obispo, Canal Zone, December 12, 1907 (A. H. Jennings); San Pablo, Canal Zone, December 24, 1907 (A. H. Jennings); Caldera Island, Porto Bello Bay, January 4, 1908, February 13, 1909 (A. H. Jennings).

Culex equivocator is very closely allied to *C. extricator*, but differs in habits, inhabiting tree-holes and occasionally ground-pools where foul, whereas *C. extricator* lives exclusively in crab-holes. We are able to distinguish both adults and larvæ on minor characters, and so keep them separate. The species probably has a wider distribution than indicated above. Theobald's description of *Culex lateropunctata* from Supenaam, British Guiana (Monog. Culicid., iv, 458, 1907), apparently agrees with our *Culex equivocator*, and may be the same species, but we can not make a positive reference one way or the other, as no mention is made by Theobald of the characters of the larvæ, nor, which is in this case especially important, of the breeding-habits.

CULEX TRACHYCAMPA Dyar & Knab.

Culex trachycampa Dyar & Knab, Can. Ent., xli, 101, 1909.

ORIGINAL DESCRIPTION OF CULEX TRACHYCAMPA:

Proboscis black, moderately long and slender, hardly swollen at the tip. Palpi black-scaled. Mesonotum blackish, clothed with dark bronzy-brown scales; abdomen subcylindrical, depressed, truncate at tip, dark-scaled above with coppery lustre, beneath with distinct white basal segmental bands. Legs blackish with bronzy lustre, the femora pale beneath to near the tip. Wings rather broad, the outstanding scales of the veins linear and narrowly ovate, denser on the forks of the second and fourth veins. Claws simple in the female. Length about 2.5 mm.

Digitized by Google

In the male the palpi are slightly longer than the proboscis, the apical portion hairy, bronzy-black throughout. Wings narrower than in the female, without the longest and narrowest scales; the coloration similar.

One male and one female, Las Cascadas, Canal Zone, Panama (A. Busck, collector). Type No. 12194, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX TRACHYCAMPA:

Female.—Proboscis moderate, slightly enlarged at tip, labellæ pale, conically tapered; vestiture black with bronzy and blue reflections; setæ small, curved, black, those on labellæ more prominently outstanding. Palpi short, less than one-sixth as long as proboscis, blackish scaled. Antennæ moderate, the joints subequal, rugose, coarsely pilose, black, hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, brownish luteous, darker on inner side. Clypeus rounded triangular, blackish, nude. Eyes black. Occiput blackish, clothed with narrow, curved scales, brown with a strong bronzy luster, scales at sides and margin of eyes broadly ovate; margin of eyes narrowly whitish, joining a patch below; many upright, forked black scales with bronzy luster on vertex; a row of setæ along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and dark bristles. Mesonotum blackish with two narrow impressed bare lines in front; vestiture of narrow, curved dark-brown scales with bronzy luster; bristles stiff, brown, those around ante-scutellar space and over roots of wings abundant and coarse. Scutellum trilobate, clothed with pale-bronzy scales, each lobe with a group of brown bristles. Postnotum prominent, elliptical, dark brown, nude, with a low, broad median carina. Pleuræ sordid grayish brown with patches of sordid-white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of dark-brown scales with submetallic luster, a row of lateral triangular, basal segmental pale spots; venter clothed with dark scales with basal pale bands on segments; tips of segments with rather coarse brown hairs.

Wings rather narrow, hyaline; petiole of second marginal cell about one-fifth as long as its cell, that of second posterior cell about half as long as its cell; basal cross-vein more than twice its length from anterior cross-vein; scales of veins long, ligulate, brown, with a blue reflection on costa, denser and narrowly ovate on forks of second and fourth veins and outer half of third vein. Halteres pale.

Legs moderate, femora whitish beneath except at tip; knees pale; tibiæ and tarsi black with a bronzy and blue reflection. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.7 mm.; wing 3 mm.

Male.—Proboscis straight, more slender than in the female, slightly enlarged apically, black scaled with a bronzy luster. Palpi somewhat exceeding proboscis in length, end of the long joint and the last two joints slightly enlarged and bearing long, dense, black hairs; vestiture of blackish scales with a slight bronzy luster. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short but slender, blackish, with pale rings above insertions of hair-whorls; hairs of whorls long, dense, black. Coloration similar to the female. Wings not narrower, the stems of the fork-cells longer, vestiture a little less abundant; wing-scales somewhat broader, particularly those on forks of second and fourth veins, which are distinctly ovate. Abdomen subcylindrical, somewhat enlarged apically, without marked lateral ciliation. Claw formula, 1.1–1.1–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Genitalia (plate 11, fig. 72): Side-pieces short and stout, about twice as long as wide, tips conically tapered; inner lobe divided into three portions from a common base, outer bearing a large leaf-like appendage, two rods with curved tips and a seta, the other two each a long filament with slightly expanded and

Digitized by Google

hooked tip. Clasp-filament stout, expanded toward tip, finely serrate on outer margin, with an inserted terminal spine. Harpes with inner branch produced into a slender stem, bearing a comb at tip, outer branch short and rudimentary. Harpagones divided into a number of plates with angular apices. Basal appendages oblique, setose.

Larva, Stage IV (plate 108, fig. 363).—Head rounded, widest through eyes, wider than long; antennæ long and stout, a tuft at outer third, part beyond slender, shaft spined; upper head-hairs short tufts, lower long, single; ante-antennal tuft multiple. Body densely pilose; lateral abdominal hairs in threes on first two segments, fours on third, in threes on fourth to sixth. Lateral comb of eighth segment of rather few spines in a patch two rows deep. Air-tube seven times as long as wide, gradually and slightly tapering outwardly, the pecten of rather long teeth, longer outwardly, reaching beyond basal third of tube; six long hair-tufts along posterior margin beyond pecten; two small tufts on dorsal aspect. Anal segment twice as long as wide, ringed by the plate, which is pilose like the body; dorsal tuft of two long and a short hair on each side; ventral brush large, confined by the chitinous ring. Anal gills small, shorter than segment, tapering, tips rounded.

The larvæ live in stagnant pools along streams. Mr. Busck received them in two instances, sent to him by sanitary inspectors. Larvæ in life distinctly striped and small. Mr. Busck labeled them in his notes "little zebra-striped *Culex*."

Panama.

Bas Obispo, Canal Zone, larvæ from stagnant pool along Obispo River, May 7, 1907 (G. C. Campbell); Las Cascadas, Canal Zone, larvæ from a pool, May 13, 1907 (C. H. Bath).

CULEX RESTRICTOR Dyar & Knab.

Culex restrictor Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 208, 222, 1906.
Culex consternator Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 59, 1908.
Culex costernator Theobald, Mon. Culic., v, 616, 1910.

ORIGINAL DESCRIPTION OF CULEX RESTRICTOR:

Antennæ with the tuft near the outer third; upper head hair triple, lower single, long; lateral hairs in twos on the second to sixth abdominal segments. Air tube 8 × 1, the pecten to one-fifth; four single hairs on posterior margin. Lateral comb of the eighth segment large; anal gills small.

Collected by the junior author in a small hole in a tree in a ravine at Almoloya, Oaxaca, Mexico. Our larva pupated, but failed to emerge.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout	19
19.	Air tube with small double or single hairs, or bare	31
31.	Air tube uniform, without any swelling	32
32.	Air tube with single hairs or bare	37
37.	Pecten of numerous teeth densely and regularly spaced	38
38.	Lateral abdominal hairs double on segments 3 to 5	39
39.	Air tube with four rather long single hairs on posterior margin	*restrictor*

ORIGINAL DESCRIPTION OF CULEX CONSTERNATOR:

Female.—Proboscis long and slender, not distinctly swollen at the apex, entirely dark-scaled, with bronzy luster; palpi nearly one-fourth the length of the proboscis, slender, dark-scaled, with bronzy luster; occiput dark-scaled, the margins of the eyes distinctly and rather broadly silver-white-scaled; mesonotum dark brown scaled,

Digitized by Google

with slight luster; pleura green, with patches of white scales; abdomen depressed, truncate at tip, clothed above with dark scales, with distinct coppery luster, the bases of the segments with lateral triangular silvery white spots; venter dull whitish-scaled, unbanded; wings with the scales along the veins dusky, long and very narrow; legs dark-scaled, with bronzy luster, the underside of the femora pale-scaled; tarsi not ringed; claws simple. Length, 4 mm.

Male.—Palpi long and slender, very slightly longer than the proboscis, dark-scaled, with bronzy luster and without annulations; head and mesothorax colored as in the female; abdomen long and slender, dark-scaled above, with coppery luster, the segments with basal silvery white lateral spots; venter pale-scaled. Length, 3 mm.

Thirty-nine specimens, Córdoba, Mexico, bred from larvæ in water in a hollow tree (F. Knab).

Type.—Cat. No. 11969, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX RESTRICTOR:

Female.—Proboscis rather long and slender, uniform, labellæ conically tapered; vestiture black with a bronzy luster; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi slender, nearly one-third as long as proboscis, black scaled, some pale scales at apex. Antennæ with joints subequal, rugose, pilose, black; tori subspherical with a cup-shaped apical excavation luteous brown, darker within; second joint slightly enlarged, pale at base; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, dark brown, nude. Occiput brown, clothed with narrow, curved bronzy-brown scales on vertex, flat white ones on sides, margin of eyes silvery-white scaled; many erect, forked bronzy-brown scales on vertex; a row of bristles along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, green, clothed with white scales and brown bristles. Mesonotum greenish brown, with two narrow impressed bare lines; vestiture of narrow, curved bronzy-brown scales, anterior margin and angles with whitish scales; bristles long, coarse, brown, abundant. Scutellum trilobate, brownish, clothed with narrow, curved pale scales, each lobe with a tuft of long brown bristles. Postnotum elliptical, prominent, brownish pruinose, nude. Pleuræ and coxæ green with patches of white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black with a strong coppery reflection; a row of basal, segmental, triangular; lateral, dull silvery-white patches; venter dull silvery-white scaled; a row of pale bristles at posterior margins of segments; tip of abdomen with coarse bristles.

Wings moderate, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein nearly twice its own length from anterior cross-vein; scales blackish brown with a blue reflection on costa, the outstanding ones linear, dense on all the veins. Halteres whitish, with darker knobs.

Legs moderate; femora bronzy black, whitish on under side nearly to tip; knees not white scaled; tibiæ and tarsi entirely dark scaled with a strong bronzy and blue luster. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.7 mm.

Male.—Proboscis long, straight, gradually enlarged to apex, entirely bronzy-black scaled. Palpi exceeding proboscis by about half the length of last joint, slender, terminal portion scarcely thickened, last segment shorter than penultimate; tip of long and last two joints with a few stiff black hairs; vestiture entirely dark with strong bronzy and blue reflections. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertions of hair-whorls; hairs long, dense, brown. Coloration similar to the female. Wings narrower, the stems of the fork-cells and vestiture about the same. Abdomen elongate, depressed, thickened apically; lateral segmental

Digitized by Google

white spots indistinct; bristles at ends of segments coarser, brown; no lateral ciliation. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Genitalia (plate 9, fig. 62): Side-pieces about three times as long as wide, conically tapered; lateral process beyond outer third, divided, both portions quadrate, the outer bearing three rods, the inner two rods; clasp-filament rather stout, uniform, with a small, stout, terminal claw. Harpes divided, inner limb slender, long, with crown of five or six spines, outer limb reduced to a small angle. Harpagones lamelliform, small. Basal lobes rounded, rather remote, setose.

Larva, Stage IV (plate 110, fig. 369).—Head rounded, widest through eyes, somewhat narrowed in front; antennæ long and stout, tuft almost at outer fourth, part beyond more slender; upper pair of head-hairs long, in threes; lower very long and single. Body with skin glabrous; lateral abdominal hairs in twos or threes on third to fifth segments, single on sixth; lateral comb of eighth segment of many spines in a large triangular patch. Air-tube long and slender, a little flaring at base, then straight, about eleven times as long as wide; pecten of short teeth on basal fifth, followed by five short single hairs along posterior aspect. Anal segment twice as long as wide, ringed by the plate; dorsal tuft of two long hairs on each side; lateral hairs a small multiple tuft; ventral brush well developed, confined by the chitinous ring. Anal gills shorter than the segment, slender, equal, their tips rounded.

The larvæ live in tree-holes. Mr. Knab found them in a small hole in a tree in a ravine. Later he found them in a large hole in a mango tree, about 3 feet from the ground; the tree was on a hill-side in a coffee orchard. The water in the hole was very dark, containing much rubbish and dead leaves, and larvæ of *Aëdes oswaldi*, another tree-hole inhabiting species, were associated. No adults were obtained from the larvæ upon which *Culex restrictor* was founded. While the larvæ from Córdoba do not agree exactly with those obtained at Almoloya, our material from the latter place is so unsatisfactory that we think it advisable to consider them conspecific, the agreement in habits making this probable.

Mexico.

Almoloya, State of Oaxaca, July 21, 1905 (F. Knab); Córdoba, March 7, 1908 (F. Knab).

CULEX RESTUANS Theobald.

Culex restuans **Theobald, Mon. Culic., ii, 119, 142, 1901.**
Culex restuans **Giles, Gnats or Mosq., 2 ed., 428, 429, 1902.**
Culex restuans **Dyar, Journ. N. Y. Ent. Soc., x, 199, 1902.**
Culex pipiens **and** ***Culex restuans*** **Smith, Ent. News, xiii, 302, 1902.**
Culex sp.**, Smith, Ent. News, xiii, 303, 1902.**
Culex restuans **Dyar, Ent. News, xiv, 41, 1903.**
Culex restuans **Beutenmüller, Ent. News, xiv, 269, 1903.**
Culex restuans **Dyar, Proc. Ent. Soc. Wash., v, 144, 146, pl. ii, ff. 4, 5, 1903.**
Culex restuans **Johannsen, Bull. 68, N. Y. State Mus., 417, 1903.**
Culex restuans **Smith, Bull. 171, N. J. Agr. Exp. Sta., 16, 1904.**
Culex restuans **Dyar & Knab, Proc. Ent. Soc. Wash., vi, 143, 1904.**
Culex restuans **Felt, Bull. 79, N. Y. State Mus., 325, 1904.**
Culex restuans **Blanchard, Les Moustiques, 325, 1905.**
Culex restuans **Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 313, 1905.**
Culex fatigans **Herrick (not Wiedemann), Ent. News, xvi, 283, 1905.**
Culex restuans **Felt, Bull. 97, N. Y. State Mus., 446, 483, 1905.**
Culex restuans **Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 208, 1906.**
Culex restuans **Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 23, 1906.**
Culex restuans **Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 4, 1906.**
Culex restuans **Weber, Ent. News, xvii, 217, 1906.**
Culex restuans **Theobald, Mon. Culic., iv, 417, 1907.**
Culex restuans **Tucker, Kans. Univ. Sci. Bull., iv, 87, 1907.**

Digitized by Google

Culex pipiens Banta (not Linnæus), Fauna Mayfield's Cave, Carn. Inst., Wash., 36, 84, 1907.
Culex restuans Girault, Ent. News, xix, 4, 1908.
Culex restuans Weber, Mutation in Mosquitoes, Weber's Archives, no. 2/ 17, 1907.
Culex restuans Viereck, 1st Ann. Rept. Comm. Health Pa., 471, 1908.
Culex restuans Dyar & Knab, Proc. Ent. Soc. Wash., xi, 36, 1909.
Culex restuans Thibault, Proc. Ent. Soc. Wash., xii, 21, 1910.
Culex restuans Theobald, Mon. Culic., v, 383, 1910.
Culex restuans Morse, Ann. Rept. N. J. State Mus., 1909, 720, 1910.
Culex restuans Smith, Rept. Ent. Dept. N. J. Agr. Coll. Exp. Stat., 1909, 458, 1910.

ORIGINAL DESCRIPTION OF CULEX RESTUANS:

Thorax bright chestnut-brown, with golden-brown curved scales and two round pale spots on the mesonotum and a patch of pale scales just in front of the root of the wings, and paler scales around the bare space in front of the scutellum. Abdomen dusky brown, with basal bands of yellow and pure-white lateral spots. Legs bronzy-brown to black, except coxæ, bases and venter of femora, which are very pale, and also a yellow knee spot. Ungues of ♀ equal and simple.

♀. Head black, with numerous pale creamy curved scales and black upright forked ones, with flat white scales at the sides of the head; palpi black, greyish at the tip; antennæ with the basal joint and base of the second joint testaceous, remainder blackish-brown, with pale pubescence; clypeus and proboscis brown.

Thorax bright chestnut-brown, with short bright golden-brown curved scales and two round spots on the mesonotum of pale creamy scales, the bare patch in front of the scutellum surrounded by almost white scales, and another patch on each side just in front of the wing roots, three rows of black bristles, the median one ending in front of the bare patch in front of the scutellum; scutellum pale; metanotum ochraceous-brown; pleuræ pale testaceous, with four patches of white scales.

Abdomen ochraceous, covered with dusky-brown scales, the bases of the segments having a band of creamy-yellow scales, with a pure-white spot on each side of the segments; first segment ochraceous, with two median tufts of blackish scales and long golden hairs; second segment with the white scales forming a median line half across the segment; the abdomen densely clothed laterally with pale golden hairs.

Legs with the coxæ, bases, and under-sides of the femora almost white, remainder deep bronzy-brown to almost black, there being, however, a very distinct yellowish knee spot; claws equal and simple.

Wings almost exactly as in *C. pipiens*. Halteres with pale ochraceous stem and fuscous knob.

Length.—6 mm.

Habitat.—Toronto, Ontario, Canada (E. M. Walker) (66).

Time of capture.—June.

Observations.—Very closely related to *C. pipiens*, but I think distinct. It differs in the basal banding of the abdomen being uniform, and not curved; in the presence of very plain white lateral spots; in the yellower tinge of the whole body, and especially in the deep golden-brown thoracic scales and paler ornamentation.

A single ♀ only received, taken on a window-pane.

I do not know if Walker described this species; I can find no record of it. A specimen is so named in the old Museum collection by Walker, and, as it is certainly distinct, and a fresh specimen has come to hand, I retain his name.

DESCRIPTION OF FEMALE, MALE, LARVA, AND PUPA OF CULEX RESTUANS:

Female.—Proboscis rather slender, uniform, labellæ conically tapered, brown; vestiture of brown scales; palpi short, one-fifth as long as proboscis, slender, dark brown, with a few outstanding setæ. Antennæ with joints subequal, rugose, pilose, black, second joint pale at base; tori subspherical with a cup-shaped apical excavation, luteous, black within; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, doubly excavated at base, dark brown, nude. Occiput brown, clothed with narrow, curved yellowish-white scales, a brown patch each side of middle, of dark suberect scales, flat white scales well down the sides, margin of eyes white scaled, many erect, forked black scales on vertex; a row of bristles along ocular margins.

Prothoracic lobes elliptical, remote dorsally, clothed with broad white scales and brown bristles. Mesonotum reddish brown with two impressed bare lines; vestiture of narrow, curved reddish-brown scales and rows of dark setæ, small patches of pale-yellow scales on anterior margins, above roots of wings, bordering

Digitized by Google

ante-scutellar space, and a pair of round spots behind the lateral depressions. Scutellum trilobate, brown, clothed with narrow, curved pale-yellow scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ yellowish brown, with patches of elliptical, flat white scales and rows of brown bristles.

Abdomen subcylindrical, truncated at tip; dorsal vestiture black with bluish reflection, a moderately broad yellowish-white band at base of each segment except the first, widening on sides on sixth and seventh segments, the one on second segment mesially produced, last segment mostly pale scaled; venter yellowish-white scaled, a narrow black band at tip of each segment; sides and venter with long coarse yellowish hairs.

Wings ample, hyaline; petiole of second marginal cell about one-sixth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales brown, blackish on costa, the outstanding ones long and linear. Halteres whitish with darker knobs.

Legs moderate, slender; femora white at base and beneath nearly to tips; vestiture otherwise black with a bronzy and blue reflection above and brassy beneath; knees narrowly whitish; hind tarsal joints more or less distinct and narrowly pale brown at bases and tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4.5 mm.

Male.—Proboscis long and straight, gradually enlarged towards apex. Palpi exceeding the proboscis by nearly the length of the last two joints, which with outer third of long joint bear many black hairs; vestiture bronzy black, a narrow white ring at basal third of long joint, last two joints with a patch of white scales at base beneath and a line of white scales along ventral surfaces of these joints. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, ringed with black at insertions of hair-whorls; hairs long, brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer; vestiture sparser. Abdomen long, depressed; dorsum with broad basal whitish bands, those on sixth and seventh segments laterally expanded, eighth segment nearly all white scaled; lateral ciliation abundant, long, pale. Claw formula, 1.1–1.1–0.0.

Length: Body about 5 mm.; wing 4 mm.

Genitalia (plate 17, fig. 124): Side-pieces more than twice as long as wide, tapered outwardly; marginal appendages on a truncated subapical prominence consisting of three rods with hooked tips, a leaf-like appendage and two setæ. Clasp-filament large, stout, tapering outwardly, with a small articulated terminal appendage. Harpes furcate, the outer branch curved, simple, the inner bearing large tufts of spines. Harpagones divided into four plates, the third one with a long tooth projecting laterally. Basal appendages short, rounded, remote, setose.

Larva, Stage IV (see figure of the entire larva, plate 53).—Head small, rather square, but not broadly transverse, sides convex at eyes, hind angles blunt, a notch at insertion of antennæ, front margin arcuate. Antennæ moderate, a rather small tuft near the middle, portion beyond tuft slightly narrower than basal part, all densely spined; four small terminal setæ and a digit on a pedestal. Both pairs of dorsal head-tufts and ante-antennal tufts multiple. Mental plate quadrate, sides long and straight; an apical tooth and eleven on each side, followed by four teeth on long sides. Mandible quadrangular, two filaments outwardly with two small filaments and two hairs arising from their bases; an outer row of cilia from a collar; outer edge with a row of short teeth; dentition of four teeth on a process, first longest; a serrate filament and row of feathered hairs within; process below cleft furcate with patches of hair; angle below mod-

Digitized by Google

erate. Maxilla elongate, conical, divided by a suture; inner half with coarse spines except towards the suture; a small tuft of hairs at tip running along the suture; outer half with two filaments centrally near the suture; a subapical spine on other side. Palpus moderate, narrowed at tip, three terminal digits and a fourth subterminal. Thorax rounded, wider than long; hairs abundant, moderate, anterior thoracic hairs about as long as head. Anterior abdominal segments short, posterior ones elongated; lateral hairs of first segment multiple, of second double, single and long on third to sixth; secondary hairs distinct, a long single subdorsal hair on fourth, fifth and seventh segments. Tracheal tubes broad, band-shaped narrowed in suture between seventh and eighth segments. Air-tube moderate, slightly fusiform, four times as long as wide; pecten teeth on basal third; single tooth short, with three long basal branches; three long scattered hairs and a small subapical tuft. Lateral comb of eighth segment of numerous scales in a triangular patch, single scale with truncate tip and five equal terminal spines. Anal segment longer than broad, ringed by the plate; dorsal hairs few; a single lateral hair; ventral brush moderate, confined by the plate. Anal gills longer than segment, rather broad, tips rounded; tracheæ visible, flexuous.

Pupa (plate 148, fig. 700).—Thoracic mass subpyriform, stout; small hair-tufts on thorax anteriorly; air-tubes moderate, slightly expanded, notched at tip. Abdomen stout; hair-tufts sparse and small, but subdorsal ones of fourth to sixth segments very long; a small tuft at apical angles of eighth segment. Anal paddles large, rounded, longer than broad.

The eggs (plate 147, fig. 690) are laid in boat-shaped masses. Girault found that the maximum and minimum number of eggs respectively in twenty egg-masses were 391 and 157, and the average number in the twenty masses 267.1. The larvæ live in ground-pools, tree-holes, and artificial receptacles. The natural habitat is probably in tree-holes, but the larvæ take readily to artificial receptacles, and are commonly found in rain-barrels and stagnant ditches. Mr. Knab found larvæ, in western Massachusetts, in a rock-pool beside a river, and these larvæ had unusually long gills; they were associated with larvæ of *Aëdes atropalpus*. The adults hibernate, and, as in other species of similar habits, increase in numbers as the season advances. Professor Smith says:

"The habits of this species are practically like those of *Culex pipiens*. It winters in the same way and under the same conditions; its biting methods are much the same, and, in fact, so far as the adult is concerned, everything that has been said of *pipiens* applies to this species as well. Eggs are as in *pipiens*, to all appearance. Both species occur in my pails and I have frequently examined the egg-boats to determine, if possible, whether any superficial differences exist, but have never found any. In general appearance and habits the larvæ are also similar; but *restuans* is not found in really foul water, in my experience. In life the two species are readily discriminated by the antennæ, which are always prominently spread out, so that the position of the tuft is readily noted. The wrigglers occur in the pails quite as early as those of *pipiens*, and Mr. Brakeley has found them in the water in an ornamental vase at Lahaway in October."

Mr. J. K. Thibault, Jr., says this is the very commonest mosquito about houses in Arkansas, but he believes it is wrongly accused of being a biter of man.

North America east of the Plains.

Lincolnville, Maine, August, 1908 (H. G. Dyar); Toronto, Ontario, Canada, August 6, 1900 (A. Gibson); Ottawa, Ontario, Canada, August 21, 1900 (J. Fletcher); Tupper Lake, New York, August, 1905 (H. G. Dyar); Center Harbor, New Hampshire, August 22, 1903 (H. G. Dyar); Saranac Inn, New York, 1900 (O. A. Johannsen); White River, Ontario, Canada, June 26, 1907

Digitized by Google

(F. Knab); West Springfield, Massachusetts, June, July, August, September, October, 1903 (F. Knab); Sheepshead Bay, New York, June, 1903 (F. E. Lutz); Montgomery, Massachusetts, September, 1903 (F. Knab); Cummington, Massachusetts, August, 1903 (F. Knab); Chicopee, Massachusetts, July 10, 1903 (F. Knab); Springfield, Massachusetts (G. Dimmock); Bellport, New York, August, 1902 (H. G. Dyar); Ithaca, New York, August 29, 1901, September 17, 1903 (O. A. Johannsen); Plummer's Island, Maryland, November 2 (H. G. Dyar); Washington, District of Columbia (T. Pergande); Woodstock, Virginia, August 5, 1904 (F. C. Pratt); St. Asaph, Virginia, June 25, 1903 (F. C. Pratt); Virginia Beach, Virginia, August 31, 1903 (E. A. Schwarz); Newark, New Jersey, August 28 (A. H. Brehme); Lahaway, New Jersey, October 1 (J. T. Brakeley); Black Mountains, North Carolina, June 2 (W. Beutenmuller); Kanawha Station, West Virginia, August 16, 1903 (A. D. Hopkins); New Richmond, Ohio, August 5, 1907 (A. A. Girault); St. Louis, Missouri, September, 1904 (A. Busck); Urbana, Illinois, September, 1904 (F. Knab); Helena, Arkansas, July 30 (H. S. Barber); Little Rock, Arkansas, July 11, 1904 (H. S. Barber); Scott, Pulaski Co., Arkansas, October 14, 1909 (J. K. Thibault, Jr.); Wister, Oklahoma, August 3, 1904 (H. S. Barber); Denison, Texas, June 24, 1904 (H. S. Barber); Agricultural College, Mississippi, June, July, December, 1900, 1901, 1902 (G. W. Herrick); Jacksonville, Florida, March 4, 1905 (H. G. Dyar); St. Anthony Park, Minnesota, July, 1903 (F. L. Washburn). Recorded also from Pennsylvania (S. E. Weber, H. L. Viereck), Indiana (Banta), and Kansas (Tucker).

Culex restuans is closely allied to *C. pipiens* and to *C. salinarius*, with both of which it occurs mixed in artificial receptacles holding water. Mr. S. E. Weber is of the opinion that these three species are mutants of one species, and has published what he considers evidence in support of his conclusion. We are unable to concur in this opinion, as we find the three species constantly different in all stages, and consequently do not adopt Mr. Weber's view. As these species show closely similar coloration in the adult, and commonly occur mixed in breeding-places near houses, most of the references to the "house mosquito" refer to the three together, and not to any one species. Most of the accounts of "*Culex pungens*" refer at least in part to the present species. In northern localities, or in small places distant from larger centers, *Culex restuans* is often the only species breeding in rain-barrels; in places where such barrels are situated in woods it may be associated with *C. territans*. In certain locations the larvæ have been found with very long gills, the reason for which is not known. It is, however, a phenomenon to be seen occasionally in other species and is apparently without value as a specific character.

Two spots of lighter colored scales upon the disc of the mesonotum have been generally considered diagnostic for this species. We find that this character, as in other similarly marked species, is evanescent and extremely unreliable. Specimens without the spots have usually been wrongly identified.

This species will have to be called *Culex territans* (see our remarks on page 300).

CULEX BARBARUS Dyar & Knab.

Culex barbarus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 205, 210, 1906.

ORIGINAL DESCRIPTION OF CULEX BARBARUS:

Very nearly allied to *C. cubensis* Bigot, but the air tube much stouter. The lateral hairs are in twos after the second abdominal segment, the subdorsal ones also in twos. Tracheæ broad.

A single specimen was collected by Mr. Busck in a lagoon pool far from habitation on the South coast of Trinidad. It was named "*Culex pipiens* L." by Mr. Coquillett.

Digitized by Google

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender... 5
5. Air tube three times as long as wide or less..... 6
6. Body spicular-granular; pecten of the air tube small, to one-third *barbarus*

DESCRIPTION OF FEMALE AND LARVA OF CULEX BARBARUS (MALE UNKNOWN):

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered, whitish; vestiture blackish, with slight bronzy luster; setæ small, curved, black those on labellæ more prominently outstanding. Palpi short, one-sixth as long as proboscis, black, with a few outstanding setæ. Antennæ with basal joints somewhat shorter than apical ones, rugose, pilose, blackish; tori subspherical with a cup-shaped apical excavation, blackish luteous, slightly pruinose; hairs of whorls sparse, moderate, black. Clypeus roundedly triangular, small, doubly excavated at base, dark brown, nude. Eyes black. Occiput blackish, clothed with narrow, curved pale-brownish scales, a darker patch each side of middle of erect, forked black scales, curved white scales along margin of eyes and on sides below; a row of black bristles along margins of eyes, those on vertex pale.

Prothoracic lobes elliptical, remote dorsally, blackish, clothed with pale scales and brown bristles. Mesonotum sordid blackish with two narrow, dorsal, impressed, bare concolorous lines; vestiture of dense, narrow, curved, lustrous, dark golden-brown scales, with paler ones around ante-scutellar region and along margins, and rows of dark bristles. Scutellum trilobate, pale brown, clothed with narrow, curved pale scales, each lobe with a tuft of brown bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ greenish luteous with rows of pale bristles and small patches of small white scales.

Abdomen subcylindrical, truncated at tip; dorsal vestiture dark brown with a slight bronzy luster, each segment except the first with a yellowish-white band at base, produced mesially, separated laterally from row of spots; a row of coarse brown bristles at tip of each segment; venter dull yellowish-white scaled.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell; that of second posterior cell slightly longer than its cell; basal cross-vein nearly three times its own length distant from anterior cross-vein; scales brown with a blue luster on costal edge, outstanding ones moderately dense, densest on fork of second vein, broadly linear. Halteres pale.

Legs moderate, femora whitish beneath nearly to tip; tibiæ and tarsi brown with a bronzy and bluish reflection and a paler shimmer beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Larva, Stage IV (plate 101, fig. 336).—Head rounded, widest through eyes, bulging on sides, a large notch at insertion of antennæ, front margin arcuate. Antennæ thick on basal two-thirds, spined; a large tuft from a notch, terminal third more slender; two long setæ subapically, a long seta, a short seta and a digit at tip. Both pairs of dorsal tufts and ante-antennal tufts multiple, long. Mental plate elongate triangular with a long central tooth and eleven on each side, basal ones a little more remote, last one small. Mandible quadrangular; two long filaments and two short slender ones before tip; an outer row of cilia from a collar; a row of curved transverse elevations on outer margin bearing hair-tufts; dentition of four teeth on a process, the first longest; spined before, a small tooth and a short trifid one at base, a long serrate filament and seven feathered hairs within; process below stout, curved, obscurely furcate, with a transverse and a longitudinal row of hairs and tuft at tip of each limb; basal angle small; a row of stout hairs within and a row at base. Maxilla elongate,

Digitized by Google

conical, divided by a suture; inner half with a row of spines along margin and two rows of cilia within; a row of long hairs at apex running down along the suture; outer half with two filaments near middle, a spine on other side and a row of small serrations on margin. Palpus small, tapered, with four minute digits at tip. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter; skin with slightly elongate granules; lateral hairs multiple on first two abdominal segments, double on third to sixth; subdorsal hairs double on third to sixth segments; tracheæ broad. Air-tube stout, distinctly tapered on outer half, three and a half times as long as wide; pecten of about nine teeth, reaching one-third of tube; single tooth a broad spine with three basal branches; four large hair-tufts on posterior aspect of tube, and a fifth on sides between last two. Lateral comb of eighth segment of many spines in a trianguar patch; single spine elongate, widened at tip and fringed with spinules. Anal segment as long as wide, ringed by the plate; dorsal tuft a group of long hairs on each side; a single lateral hair; ventral brush well developed, confined to barred area, posteriorly situated. Anal gills moderate, about as long as anal segment, rather blunt at tips.

The larvæ live in ground-pools of foul water. Mr. Busck bred the type specimen from a lagoon pool of dirty ill-smelling water, associated with *Culex coronator*. The larva resembles that of *Culex quinquefasciatus* but is distinguishable on minor characters. The adult, which we know only from a single female, is also distinct.

Island of Trinidad, West Indies.

South coast of Trinidad, June 20, 1905 (A. Busck).

CULEX SIMILIS Theobald.

Culex nigritulus Taylor (not Zetterstedt), Rev. de med. trop., iv, 107, 117, 165, 171, 1903.
Culex similis Theobald, Mon. Culic., iii, 207, 1903.
Culex nigritulus Pazos (not Zetterstedt), Bull. Soc. Ent. France, 134, 1904.
Culex scolasticus Pazos (not Theobald), Bull. Soc. Ent. France, 134, 1904.
Culex similis Theobald, Journ. Econom. Biol., i, 33, 1905.
Culex similis Theobald, Mosq. or Culicid. Jamaica, 26, 1905.
Culex factor Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 212, 1906.
Culex regulator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 213, 1906.
Grabhamia scholasticus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Culex palus and *Culex similis* Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 23, 1906.
Culex similis Theobald, Mon. Culic., iv, 448, 1907.
Culex similis Aiken, Brit. Guiana, Med. Annual, xv, 64, 1907.
Culex aikenii Dyar & Knab (in part), Proc. U. S. Nat. Mus., xxxv, 61, 1908.
Culex lachrimans Dyar & Knab (in part), Smiths. Misc. Colls., quart. iss., iii, 259, 1909.
Culex similis Dyar & Knab, Proc. Ent. Soc. Wash., xi, 37, 1909.
Culex similis Pazos, San. y Ben., ii, 49, 557, 1909.
Culex palus Pazos (not Theobald), San. y Ben., ii, 50, 1909.
Culex aikenii Aiken (in part, not Aiken), Brit. Guiana, Med. Annual, 1908, 9, 1909.
Culex similis Theobald, Mon. Culic., v, 361, 1910.
Culex aikenii Theobald, Mon. Culic., v, 616, 1910.

ORIGINAL DESCRIPTION OF CULEX SIMILIS:

Thorax reddish-brown, with a very minute dull golden brown and a few black scales, and three double rows of black bristles; pleuræ pale ochraceous; metanotum pale. Abdomen deep brown, with narrow pale basal bands, which on the last three segments spread out laterally. Legs deep brown, unbanded, coxæ and venter of femora pale; ungues small, equal and simple. Wings with typical *Culex* scales; stem of the first sub-marginal nearly half the length of the cell.

♀. Head brown, covered with narrow-curved very pale creamy scales and flat lateral ones and with numerous black upright forked scales; antennæ deep brown, with brown verticils and pale pubescence, basal joint and base of the second joint pale testaceous; palpi deep brown; proboscis deep brown, apex testaceous.

Digitized by Google

Thorax reddish-brown, scantily clothed with very small curved hair-like scales of a dull golden-brown to bronzy hue and a few scattered blackish ones, with three rows of black bristles, the median one double; metanotum pale ochraceous brown; scutellum pale brown, with a few minute black hair-like scales and seven deep brown border bristles to the mid lobe; pleurae nude, pale ochraceous, with a few black and pale bristles.

Abdomen deep brown, with basal pale bands which spread out laterally on the last few segments; first segment fuscous with two median patches of black scales; posterior border-bristles pale. Legs deep brown, with dull violet reflections, coxae and venter of femora pale, the fore femora rather swollen; apex of femora and tibiae with traces of pale spots; ungues small, equal and simple.

Wings with rather dense typical brown *Culex* scales; costal border deeper brown than the rest of the wings; first submarginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem not quite the length of the cell; stem of the second posterior cell as long as the cell; posterior cross-vein about its own length distant from the mid-cross vein; fringe brown; halteres pale ochraceous, slightly darker at the top.

Length.—5 mm.

Habitat.—Jamaica (Dr. Grabham).

Time of capture.—March (2. 3. 02).

Observations.—Described from a single perfect ♀ taken in the Red Hills, Kingston, by Dr. Grabham.

It is closely allied to *C. flavipes*, Macquart, but can be told from it by the absence of the two thoracic lines and by the longer stem to the first sub-marginal cell. From *C. fatigans*, which it also superficially resembles, it can at once be told by the minute hair-like curved thoracic scales. It comes near the African *Culex masculus*, Theobald, in the table (Vol. II., p. 118), having an unadorned thorax, to which it is also closely related, but separated again by the minute thoracic scales.

ORIGINAL DESCRIPTION OF CULEX REGULATOR:

Antennæ with the tuft nearly at the outer third, pale at base. Head hairs in threes; body pilose; lateral hairs in twos after the second abdominal segment; tracheæ broad. Air tube 7 × 1, with long single hairs, the pecten reaching to one-fourth. Anal gills long and pointed.

Collected by Mr. Busck in an old bucket in a field in San Domingo. The adults were named "*Culex salinarius* Coq."

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender..	5
5.	Air tube four times as long as wide or over.....	7
7.	Anal appendages four, normal.....	8
8.	Air tube with four paired tufts posteriorly outwardly (sometimes increased by additional ones basally), the subapical one moved laterad out of line, usually situated at the outer third of the tube.....	14
14.	Air tube long, over 5 × 1, the sides nearly straight without marked tapering	15
15.	Body spicular-pilose	16
16.	Air tube 7 × 1, the tufts single and very long; antennæ pale.	*regulator*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX SIMILIS:

Female.—Proboscis moderate, subcylindrical, slightly enlarged apically, labellæ conically tapered, pale; vestiture of bronzy-brown scales. Palpi short, one-fifth as long as proboscis, moderate, black with a bluish reflection and with a few outstanding setæ. Antennæ with the joints subequal, rugose, pilose, black, second joint attenuated at base; tori subspherical, with a cup-shaped apical excavation, blackish; hairs of whorls sparse, moderate, black. Clypeus broadly rounded, doubly excavated at base, blackish brown, nude. Eyes black. Occiput sordid brown, clothed with small, narrow, curved pale-brown scales, a patch of narrow, elliptical white scales on lower part of sides and along margins of eyes; many erect, forked black scales, forming a dense patch on each side of vertex; a row of bristles along ocular margins.

Prothoracic lobes elliptical, remote dorsally, clothed with broad white scales and dark bristles. Mesonotum dark brown, with two bare concolorous lines; vestiture of rather sparse, minute, hair-like reddish-brown scales and rows of

Digitized by Google

dark coarse setæ. Scutellum trilobate, brownish, luteous, clothed with hair-like pale reddish-brown scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, whitish luteous, nude. Pleuræ and coxæ greenish luteous with rows of brown bristles.

Abdomen subcylindrical, depressed, truncated at tip; dorsal vestiture dark brown with a bluish reflection, a series of basal narrow bands on all the segments but the first, that of second segment mesially produced, those on sixth and seventh segment broadly expanded at sides; venter yellowish-white scaled, a black band at tip of each segment; hairs at tips of segments rather long and pale.

Wings rather broad, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein its own length distant from anterior cross-vein; scales brown with a bluish luster on costa, outstanding ones moderate, linear, denser on fork of second vein. Halteres whitish with darker knobs.

Legs moderate, slender; femora white at base and beneath nearly to tips; tips of posterior tibiæ white; vestiture otherwise black with blue reflection above and brassy beneath; knees narrowly whitish. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4 mm.

Male.—Proboscis straight, gradually enlarged towards apex, bronzy black with a paler shade beneath at middle. Palpi exceeding the proboscis by nearly the length of the last two joints, which with the end of the long joint are thickened and bear many black hairs; vestiture bronzy black, bases of last two joints white scaled beneath. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, white, ringed with black at insertions of hairs-whorls; hairs long, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer; vestiture a little sparser. Abdomen elongate, depressed; basal pale bands broad, greatly expanded laterally on sixth and seventh segments; lateral ciliation long and abundant, pale yellowish. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Genitalia (plate 19, figs. 135 and 136): Side-pieces over twice as long as wide, tips conically rounded; lateral process quadrate bearing a leaf-like appendage and rods with pointed tips; clasp-filament moderate, slightly enlarged basally with small terminal claw. Harpes divided, inner limb rounded, stout, crowned with dense spines, outer limb curved, blade-like. Harpagones divided into a number of plates with angular corners, one projecting as far as tips of harpes, expanded and coarsely toothed. Basal appendages large, rounded, setose.

Larva, Stage IV (plate 101, fig. 335).—Head rounded, widest through eyes, bulging on sides, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, curved, thick and well spined on basal two-thirds with a large hair-tuft from a notch; two long setæ shortly subapical, a long seta, a short one and a digit at tip. Mental plate triangular, not as thick as usual, with a stout central tooth and eight on each side, basal ones more sparsely placed, a very small ninth tooth on side. Both pairs of dorsal head-hairs in threes, ante-antennal tuft multiple. Mandible quadrangular; three filaments and a tuft of hair before tip; an outer row of cilia from a collar; a row of rounded transverse prominences on outer margin, each bearing a long hair and tuft of short ones; dentition of four teeth on a process, first longest; a spine before, a small tooth at base, a long filament and row of feathered hairs within; process below obscurely furcate with a longitudinal and transverse row of hairs and a tuft at tip of each limb; basal angle very slight with a row of long hairs within; a basal row of hairs. Maxilla elongate, conical at tip, divided by a suture; inner half with a row of long spines along margin, basal ones feathered, two rows of cilia

Digitized by Google

within; row of long hairs at tip, running down along the suture; outer half with two filaments below middle and a spine on other side. Palpus small, with four irregular terminal digits. Thorax rounded, wider than long; abdomen moderate, the anterior segments shorter, lateral hairs multiple on first two segments, in twos on third to sixth; skin pilose; tracheæ broad. Air-tube long, slender, uniformly tapered, seven times as long as wide; pecten short, reaching one-fourth; single teeth broad with four to six branches; four single hairs on posterior margin beyond pecten, third moved laterally out of line. Lateral comb of eighth segment of small, narrow spines in a rather large triangular patch; single spine elongate, widened at tip, with an apical fringe of spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft a group of long hairs on each side; a single lateral hair; ventral brush well developed, confined to the barred area. Anal gills long, twice as long as the segment, regularly tapered to tip.

The larvæ live in ground-pools of foul water and also in artificial receptacles. Mr. Busck found them in an extended, open, lagoon-pool and in an old bucket in a field. Taylor has observed the eggs and states that they are laid in a raft, in the manner of *Culex pipiens*. The mass is said to be smaller than that of *Culex quinquefasciatus*, which commonly occurs in the same water, and the number of eggs is from 200 to 300. The individual eggs measure 0.6 mm. in length and 0.14 mm. in diameter.

Antilles and Florida; a varietal form in British Guiana.

St. Vincent, West Indies, July 14, 1905 (A. Busck); Santo Domingo, August 17 and 22, 1905 (A. Busck); Kingston, Jamaica (M. Grabham); Havana, Cuba, January 20, 1904 (J. R. Taylor); New Providence Island, Bahamas, February, 1915 (H. G. Dyar); Jacksonville, Florida, March 4, 1905 (H. G. Dyar), October 12, 1908 (H. Byrd); Pokatee, Florida, March 19, 1905 (A. N. Caudell); Green Cove Springs, Florida (A. N. Caudell); Miami, Florida, March, 1905 (Dyar & Caudell).

Culex similis was first identified as *Culex nigritulus*, in error, and subsequently described by Theobald as *Culex similis*. The *Culex scolasticus* and *C. palus* of Pazos are misidentifications, as we have determined from the specimens concerned. *Culex regulator* was named from larvæ, but proves to be the same species. Specimens received from Mr. J. Aiken in British Guiana were named *Culex aikenii*, subsequently changed to *Culex lachrimans*, owing to preoccupation of the name. The adults and larvæ, it now appears, were wrongly associated by the collector, the adults proving to be *Culex quinquefasciatus*, the larvæ *Culex similis*. The true adults of these larvæ have been found among the material sent by Mr. Aiken, and prove to be *Culex similis*, but differing from the Antillean type especially in the lack of lateral production of the band on the sixth abdominal segment. We therefore consider them to be a distinct geographical race, for which the varietal name *Culex similis lachrimans* may be retained. This race does not occur in the territory covered by the present work, and we therefore give it no further consideration in this connection. The specimens recorded by Theobald from New Amsterdam, British Guiana (Journ. Econ. Biol., I, 33, 1905, and Mon. Culic., iv, 448, 1907), are undoubtedly this race. *Culex similis* is closely related to *C. salinarius* and replaces that species in the Antilles and in Florida.

Culex palus Theobald may prove to be an earlier name for this species (see our remarks under *C. palus*).

CULEX PALUS Theobald.

Culex palus **Theobald, Mon. Culic., iii, 194, 1903.**
Culex palus **Theobald, Mon. Culic., iv, 456, 1907.**
Culex palus **Aiken, Brit. Guiana Med. Annual, xv, 65, 1907.**
Culex palus **Theobald, Mon. Culic., v, 360, 1910.**

Digitized by Google

ORIGINAL DESCRIPTION OF CULEX PALUS:

Thorax reddish-brown, with traces of dusky lines; pleuræ ochraceous. Abdomen dusky-brown, with narrow basal grey bands, last segment unbanded; venter grey. Legs brown, unbanded; venter and base of femora grey; knee-spot and apex of hind tibiæ grey. Wings of ♀ with similar venation to *fatigans*. Male palpi black, traces of one pale basal band only.

♀. Head brown, with very small narrow-curved dull golden scales and black upright forked scales on the occiput, small flat greyish-white ones on the sides of the head; antennæ, palpi, and proboscis deep brown, the palpi with short pale golden hairs.

Thorax reddish-brown, with scanty small bronzy-brown, thin narrow-curved scales and dark brown bristles, which show more or less clearly in lines; scutellum paler brown, with thin narrow curved bronzy-brown scales; metanotum deep chestnut-brown; pleuræ pale, ashy-grey.

Abdomen pallid, covered more or less scantily with flat dusky-brown scales, narrow basal bands of white scales and brown border-bristles, the last two segments with the banding not so prominent; the basal white-scaled bands look more prominent than they really are, owing to the few scales present allowing the pale integument to shine through; venter pallid.

Legs brown; coxæ, base, and venter of femora pale grey; the knee-spot and tibio-metatarsal joint pale, owing to an absence of scales; ungues small, equal and simple.

Wings with typical brown *Culex* scales; first sub-marginal cell longer and narrower than the second posterior cell, its base a little nearer the base of the wing, the cell about two and a half times the length of the stem; second posterior cell about one and a half times the length of its stem; posterior cross-vein about two and a half times its own length distant from the mid. Halteres pale ochraceous.

Length.—3 to 3.7 mm.

♂. Darker than the ♀. Palpi brown; apical joints deep black, with black hairs, a trace of pale banding on the ante-penultimate segment.

Antennæ with deep brown plume-hairs; proboscis brown, with long brown hairs beneath about the middle of its length.

Thorax as in the ♀; metanotum and pleuræ pale.

Abdomen deep blackish-brown, with five prominent basal white bands, the last two spreading out laterally.

Legs brown; coxæ, venter of femora, and their base pale grey; a prominent yellow spot at the tibio-metatarsal joint; fore and mid ungues unequal, both uniserrated; the tooth of the larger in the fore pair much bent downwards.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, their bases nearly level; stem of the former equal to nearly half the length of the cell, stem of the latter nearly as long as the cell; posterior cross-vein not quite twice its own length distant from the mid cross-vein; scales on the branches of the first fork-cell rather thick.

Length.—3.5 to 4 mm.

Habitat.—St. Vincent, Barbardos (Dr. Low).

Time of appearance.—June (Barbardos).

Observations.—Described from a single female and several males bred by Dr. Low. The larvæ were obtained in a swamp at Barbados, and in a marsh behind Kingstown, St. Vincent. It is a very small delicate *Culex*, very like *C. nigritulus*, Zetterstedt, but clearly distinct, yet by means of a hand-lens the only difference is seen in the ♂ palpi of *nigritulus* being banded with two bands. The scale structure of the thorax is, however, different: in this species the scales are very thin, narrow, and curved, and deep bronzy-brown.

There are no specimens that we have been able to identify with this species in the collection of the U. S. National Museum. It is highly probable that the specimen from British Guiana, described by Theobald as the male of this species (Mon. Culic., iv, 456, 1910) belongs to a different species. The localities are remote and in males the vestiture is usually so defective that they can not be associated with any certainty on superficial characters.

This may be the same as *Culex similis* Theobald. Mr. F. W. Edwards, of the British Museum, is of this opinion and we consider it highly probable. Theobald's comparison with *C. nigritulus* (sense of Theobald, not Zetterstedt) and his indication of minute sparse scales on the thorax certainly point in this direction, as *C. similis* is the only species with this character that we know from the West Indies. Theobald's type was evidently a much abraded specimen.

Digitized by Google

CULEX REVOCATOR Dyar & Knab.

Culex revocator Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 256, 1909.

ORIGINAL DESCRIPTION OF CULEX REVOCATOR:

Entirely similar to *Culex cubensis* Bigot, except that the labellæ and tip of proboscis are white or whitish-scaled, and other minor differences.

Dr. Grabham sent us the specimens some time ago with the tentative determination "*Culex cubensis?*" We verified this determination at the time, but a later reexamination revealed the difference specified above.

Twenty-five specimens, Hope Gardens and Newcastle, Jamaica (M. Grabham).

Type no. 12100, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX REVOCATOR:

Female.—Proboscis moderate, uniform, labellæ conically tapered; vestiture black with a whitish shade beneath, strongest in middle, extreme apex and labellæ white scaled; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth the length of proboscis, uniform, clothed with blackish scales, setæ at base long and outstanding. Antennæ moderate, joints subequal, rugose, pilose, blackish, second joint scarcely enlarged; tori subspherical, with a cup-shaped apical excavation, yellowish shading to dark brown on inner side. Clypeus rounded triangular, convex, brownish black, nude, slightly pruinose. Eyes black. Occiput brown, clothed with narrow, curved scales, pale brownish on vertex, dull white on sides and along margins of eyes; numerous erect, forked scales, yellowish white on vertex, dense and black on sides.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with a few narrow pale scales and brown bristles. Mesonotum dark brown, with two narrow impressed dorsal bare lines, clothed with narrow pale-bronzy scales with a strong brassy luster, those before scutellum and two faintly indicated subdorsal stripes paler; numerous brown bristles. Scutellum trilobate, luteous, clothed with narrow pale scales with a brassy luster, each lobe with a tuft of brown bristles. Postnotum elliptical, brown, nude. Pleuræ and coxæ luteous brown, clothed with patches of flat white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip, clothed with blackish scales dorsally, which have a slight bluish reflection, each segment except the first with a basal transverse band of yellowish-white scales, each band widest in middle, those on first four segments distinctly triangular and separated from lateral spots; a row of basal segmentary triangular lateral white spots; last segment yellowish-white scaled with a black spot in middle towards tip; seventh segment white scaled along sides; venter clothed with yellowish-white scales, membrane beneath dark; ends of segments with yellowish rather long hairs, abundant at tip.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell; that of second posterior cell about as long as its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins brown with a blue luster on costa, narrowly linear. Halteres whitish with brownish knobs.

Legs moderate, uniform; femora clothed above with black scales with a bluish and bronzy luster, beneath broadly white to tips, except hind pair; knees and tips of hind tibiæ whitish; tibiæ and tarsi black scaled with pale-brassy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.5 mm.

Male.—Proboscis straight, gradually enlarged towards apex, with a indistinct broad pale ring beyond middle, underside pale scaled throughout, tip and

Digitized by Google

labellæ pale. Palpi exceeding the proboscis by the length of the last joint, slender, uniform, apical portion slightly enlarged; vestiture black, with pale scales intermixed on long joint, a white ring at basal third of long joint, a patch of white scales at bases of last two joints above, a pale shade beneath for entire length; abundant long black hairs at end of long joint and on last two joints. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black enlarged rings at insertions of hair-whorls; hairs long, dense, black; tori entirely brown. Coloration similar to the female. Abdomen long, depressed, nearly parallel-sided; dorsal white bands broader and reaching sides, not triangular, but that on second segment produced in the middle, the others straight, those of sixth and seventh segments broadly expanded at the sides; last segment pale scaled, with a black patch in the middle; lateral ciliation long, fine, pale yellowish. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.2 mm.

Genitalia (plate 15, fig. 111): Side-pieces over twice as long as wide, narrowed at tips; inner prominence small, low, bearing three rods and a leaf-like appendage; clasp-filament long and slender with a stout terminal claw. Harpes with inner branch stout and crowned with spines, outer rudimentary. Harpagones divided into four narrow plates, the two outer ones rather long and subequal, the outer with pointed recurved tip. Unci forming a small basal cone. Basal appendages remote, each bearing a row of stout setæ.

Larva, Stage IV (plate 99, fig. 325).—Head rounded, wider than long, widest through eyes; antennæ rather long and stout, spinose towards base, a tuft beyond middle, the part beyond it slender; head-hairs all multiple. Body with skin glabrous; lateral abdominal hairs in sixes on first segment, threes on second, twos on third to sixth; subdorsal hairs in twos on third to sixth segments. Lateral comb of eighth segment of many spines in a large triangular patch. Air-tube about five times as long as wide, subfusiform, pecten of about eleven teeth on less than basal third; four multiple hair-tufts beyond it, the subapical one moved laterad out of line and situated well beyond middle of tube. Anal segment longer than wide, ringed by the plate, which has an incision ventrally; dorsal tuft of three hairs of different lengths on each side; lateral hair single, small; ventral brush ample, confined by the chitinous ring. Anal gills about as long as the segment, equal, with pointed tips.

We have no notes on the life history and habits.

Island of Jamaica, West Indies.

Hope Gardens and Newcastle (M. Grabham).

Culex revocator is closely allied to *Culex quinquefasciatus*, but differs as shown in the tables. It probably is the Jamaican representative of this species.

CULEX QUINQUEFASCIATUS Say.

Culex quinquefasciatus **Say, Journ. Acad. Nat. Sci. Phil., iii, 10, 1823.**
Culex pungens **Wiedemann (not Robineau-Desvoidy), Auss. zweifl. Ins., i, 9, 1828.**
Culex fatigans **Wiedemann, Auss. zweifl. Ins., i, 10, 1828.**
Anopheles ferruginosus **Wiedemann, Auss. zweifl. Ins., i, 12, 1828.**
Culex flavipes **Macquart, Dipt. Exot., i, part 1, 35, 1838.**
Culex flavipes **Macquart, Mém. Soc. R. Sc. de Lille, 1838, pt. 2, 39, 1838.**
Culex cubensis **Bigot, Ramon de la Sagra, Hist. fisica Isl. Cuba, vii, 329, 1856.**
Culex cubensis **Finlay, Anal. Acad. Cienc. Habana, xviii, 153, 1881.**
Culex 5-fasciatus **Say, Ent. of N. Amer., ii, 39, 1883.**
Culex **sp. nov? Williston, La Naturaleza, vii, 213, 1887.**
Culex penafieli **Williston, La Naturaleza, vii, 326, 1887.**
Culex **(? sp.) Skuse, Proc. Linn. Soc. N. S. Wales, ser. 2, iii, 1748, 1889.**

Digitized by Google

Culex flavipes Lynch Arribálzaga, Rev. Mus. de La Plata, ii, 158, 1891.
Culex penafieli Sánchez, Datos para la Zool. méd. Mexicana, 135, 1893.
Culex ciliaris Bancroft (not Linnæus), Journ. & Proc. R. Soc. N. S. Wales, xxxiii, 48, 1898.
Anopheles ferruginosus Giles, Gnats or Mosq., 177, 1900.
Culex skusii Giles, Gnats or Mosq., 292, 1900.
Culex pungens Giles, Gnats or Mosq., 197, 294, 1900.
Culex fatigans Giles, Gnats or Mosq., 198, 298, 1900.
Culex flavipes Giles, Gnats or Mosq., 198, 304, 1900.
Culex anxifer Grandpré et Charmoy (not Bigot), Les Moustiques, 5, 1900.
Culex ciliaris Bancroft (not Linnæus), Journ. Trop. Med., iii, 149, 1900.
Culex fatigans Evans, Proc. Asiat. Soc. Bengal, 65, 1901.
Culex pungens Howard, Mosquitoes, 238, 1901.
Culex quasipipiens Theobald, Mon. Culic., ii, 136, 1901.
Culex fouchowensis Theobald, Mon. Culic., ii, 137, 1901.
Culex fatigans Theobald, Mon. Culic., i, 28; ii, 151, 1901.
Culex fatigans subspecies *luteoannulatus* Theobald, Mon. Culic., ii, 159, 1901.
Culex fatigans subspecies *macleayi* Theobald (not *Culex macleayi* Skuse), Mon. Culic., ii, 159, 163, 1901.
Culex fatigans subspecies *skusii* Theobald, Mon. Culic., ii, 159, 164, 1901.
Culex fatigans subspecies *trilineatus* Theobald (not *Culex trilineatus* Theobald), Mon. Culic., ii, 159, 1901.
Culex pungens Theobald, Mon. Culic., ii, 165, 1901.
Culex fatigans Ribas, Brazil Medico, xv, 413, 1901.
Culex pipiens Grassi (in part, not Linnæus), Studi . . . sulla Malaria, 2 ed., 10, 54, 1901.
Culex pipiens Herrick (not Linnæus), Science, n. s., xiv, 329, 1901.
Culex pipiens Herrick (not Linnæus), Miss. Agr. Exper. Stat., Bull. 74, 5, 1901.
Anopheles ferruginosus Giles, Gnats or Mosq., 2 ed., 329, 1902.
Culex fatigans Giles, Gnats or Mosq., 2 ed., 433, 438, 1902.
Culex fatigans Durham, Thompson Yates Lab. Rept., iv, 541, 1902.
Culex fatigans Durham, Liverpool Sch. Trop. Med., Mem. vii, 541, 557, 1902.
Culex fatigans Goeldi, Os Mosq. no Pará, Bull., 1902.
Culex fatigans Verrill, The Bermuda Islands, 333, 1903.
Culex fatigans Theobald, Mon. Culic., iii, 225, 1903.
Culex pipiens Taylor (not Linnæus), Rev. de Med. Trop. Habana, iv, 116, 171, 1903.
Culex pungens Parker, Beyer & Pothier, Bull. 13, Yell. Fev. Inst., U. S. Publ. Health & Marine Hosp. Serv., 37, 1903.
Culex pipiens Van Dine (not Linnæus), Bull. vi, Hawaii Agr. Exper. Stat., 14, 1904.
Culex pipiens Pazos (not Linnæus), Bull. Soc. Ent. Fr., 1904, 134, 1904.
Culex fatigans Theobald, 1st Rept., Wellcome Res. Lab., Khartoum, 76, 1904.
Culex fatigans Bourroul, Mosq. do Brasil, 73, 1904.
Culex pipiens Lebredo (not Linnæus), Rev. de Med. Trop. Habana, v, 171, 1904.
Culex fatigans Goeldi, Bol. Mus. Goeldi, iv, fasc. 2, 162, 1904.
Culex fatigans Theobald & Grabham, Mosq. or Culic. Jamaica, 27, 1905.
Culex fatigans Felt, N. Y. State Mus., Bull. 97, 483, 1905.
Culex fatigans Blanchard, Les Moustiques, 325, 353, 1905.
Culex pipiens Lebredo (not Linnæus), Journ. Infect. Diseas., Suppl. 1, 332, 1905.
Culex pipiens Lebredo (not Linnæus), Rev. de Med. Trop. Habana, vi, 117, 1905.
Culex pipiens Coffin (not Linnæus), in Shattuck, The Bahama Ids., 285, 1905.
Culex fatigans Goeldi, Os Mosq. no Pará, Mem. Mus. Goeldi, iv, 62, 86, 1905.
Culex fatigans Knab, Journ. N. Y. Ent. Soc., xiv, 60, 1906.
Culex fatigans Theobald, Science Progress, i, 70, 1906.
Culex cubensis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 214, 1906.
Culex cubensis Knab, Psyche, xiii, 131, 1906.
Culex pipiens Coquillett (in part, not Linnæus), U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 23, 1906.
Culex quinquefasciatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 7, 1906.
Culex fatigans, C. cubensis Dyar, U. S. Dept. Agr., Bur. Ent., circular 72, 3, 1906.
Culex fatigans Christophers, Sci. Mem. Off. Med. & San. Depts. Govt. India, n. ser., no. 25, 7, 1906.
Culex cubensis Dyar, Proc. U. S. Nat. Mus., xxxii, 124, 1907.
Culex fatigans Kirkaldy, Proc. Hawaiian Ent. Soc., i, 121, 1907.
Culex fatigans Grünberg, Blutsaug. Dipteren, 101, 1907.
Culex fatigans Autran, Anal. Dep. Nac. Hig., xiv, 21, 1907.
Culex osakaensis Theobald (in part), Mon. Culic., iv, 439, 1907.
Culex christophersii Theobald, Mon. Culic., iv, 453, 1907.

Digitized by Google

Culex fatigans, Peryassú, Os Culic. do Brasil, 208, 1908.
Culex aikenii Dyar & Knab (in part), Proc. U. S. Nat. Mus., xxxv, 61, 1908.
Culex fatigans Banks, Philipp. Journ. Sci., iii, 250, 1908.
Culex fatigans Bancroft, Ann. Queensl. Mus., no. 8, 31, 1908.
Culex cubensis Busck, Smiths. Misc. Colls., quart. iss., lii, 67, 1908.
Culex lachrimans Dyar & Knab (in part), Smiths. Misc. Colls., quart. iss., lii, 259, 1909.
Culex quinquefasciatus Dyar & Knab, Proc. Ent. Soc. Wash., xi, 34, 1909.
Culex quinquefasciatus, race *dipseticus* Dyar & Knab, Proc. Ent. Soc. Wash., xi, 34, 1909.
Culex cubensis Pazos, Sanidad y Ben., ii, 49, 554, 1909.
Culex cubensis Aiken, Brit. Guian. Med. Ann., 1908, 10, 1909.
Culex quinquefasciatus Thibault, Proc. Ent. Soc. Wash., xii, 21, 1910.
Culex pipiens Theobald (in part), Mon. Culic., v, 381, 1910.
Culex fatigans Theobald, Mon. Culic., v, 383, 1910.
Culex pungens Theobald, Mon. Culic., v, 385, 1910.
Culex quinquefasciatus Herrera, Anal. Inst. Med. Nac. (Mexico), xi, 163, 1911.
Culex quinquefasciatus or *fatigans* Herrera, Anal. Inst. Med. Nac., xi, 163–210, 1911.
Culex pungens or *quinquefasciatus* Herrera (in part), Anal. Inst. Med. Nac., xi, 169, 1911.
Culex peñafieli Herrera, Anal. Inst. Med. Nac., xi, 191, 1911.
Inaculex quinquefasciatus Herrera, Anal. Inst. Med. Nac., xi, 234, 1911.
Culex goughii Theobald (in part), Union S. Afr., Dept. Agr., 1st Rept. Vet. Res., 269, 1911.
Culex pipiens, var. *fatigans* Edwards, Bull. Ent. Res., ii, 262, 1911.
Culex pipiens Brèthes (not Linnæus), Anal. Mus. Nac. Buenos Aires, Ser. 3, xiii, 469, 1911.
Culex quinquefasciatus Fullaway, Ann. Rept. Hawaii Agr. Exp. Station, 1912, 16, 1913.
Culex quinquevittatus Marshall, Rev. Applied Ent., I, ser. B, 11, 1913.
Culex fatigans Edwards, Bull. Ent. Res., iv, 55, 1913.

ORIGINAL DESCRIPTION OF CULEX QUINQUEFASCIATUS:

Body cloathed with cinereous hair; abdomen annulate with blackish.

Inhabits the western states.

Eyes deep black; *antennæ* fuscous, region of the base paler; *proboscis* black; *thorax* with a dilated dorsal fuscous vitta; *pectus* each side varied with blackish; *halteres* entirely whitish; *scutel* glabrous; *wings* with dusky nervures, immaculate; *feet* moderate, fuscous; *thighs* whitish; *abdomen* cinereous; *tergum* with five black, broad, fasciæ; *tail* black above.

Length about one-fifth of an inch; proboscis one-tenth of an inch.

This is an exceedingly numerous and troublesome species. We found them in great numbers on the Mississippi in May and June. The hairy covering is very deciduous, and when an individual is caught by hand, the back of the thorax, in consequence of being denuded by the touch, exhibits the dorsal vittæ of a blackish colour confluent at the base, with an oval black spot on each side. The abdominal annuli are sometimes fuscous or even light brown.

Legs much shorter than those of the preceding species [*Anopheles punctipennis*], but like them in not being annulated.

ORIGINAL DESCRIPTION OF CULEX PUNGENS (WIEDEMANN):

Ferruginosus; abdomine fusco, incisuris flavidis. Rostbräunlich, mit braunem Hinterleibe, dessen Einschnitte gelblich sind.—2 bis 2 1/4 Linien ♀—Aus Neu-Orleans.

Fühler, Taster und Rüssel schwärzlichbraun, letzerer unten gelblich. Rückenschild stark rostbräunlich, in gewisser Richtung mit zwei wenig deutlichen gelblichen Linien; Brustseiten gelblich, hinten allmählig in's Weisse übergehend. Hinterleib braun, mit deutlich gelblichen Abschnitten; zwei oder drei letzte Abschnitte an beiden Seiten mit gelblichem Striemchen. Flügel ungefleck, mit braunbeschuppten Adern; Schwinger gelblich.—In meinem Museum.

ORIGINAL DESCRIPTION OF CULEX FATIGANS:

Fuscus; thorace bivittato; abdomine albo fasciato; pedibus flavidis. Braun; Rückenschild zweistriemig; Hinterleib weissbandirt; Beine gelbich.—2 Linien ♂ ♀—Ostindien.

Fühler braun; Taster und Rüssel gelblich, an der Spitze in gewisser Richtung bräunlich; Untergesicht schneeweiss. Rückenschild braun, mit zwei viel dunklern

Digitized by Google

linienartigen Striemen; Brustseiten gelblich. Jeder Hinterleibsabschnitt an der Basis mit weisser Binde. Flügel wasserklar mit braunen Schüppchen, und in gewisser Richtung weisslichen Fransen des Innenrandes. Beine in gewisser Richtung hin und wieder weisslich.—In meiner Sammlung.

ORIGINAL DESCRIPTION OF ANOPHELES FERRUGINOSUS:

Ferruginosus ; abdomine fusco; alis immaculatis. Rostbraun; Hinterleib schwärzlichbraun; Flügel ungefleckt.—2 1/2 Linien ♀—Aus Neu-Orleans.

Say Journ. Acad. Philad. iii. 10, 2: Cul. quinquefasciatus.*

Fühler und Taster braun, diese dunkeler mit an der Wurzel wenig schneeweissen Gliedern. Rüchenschild gesättigt rostbraun, nur in gewisser Richtung, besonders von hinten betrachtet, weisslich, und dann linienförmige Striemen zeigend. Hinterrücken ohne Striemen. Hinterleib braunschwärzlich, gelbichbehaart. Flügeladern braunbeschuppt; Schwinger fast weiss mit braunem Knopfe. Beine kürzer als bei der vorigen Art, schwärzlichbraun, mit gelblichen Schenkeln.—In meiner Sammlung.

---

* Alle von *Thom. Say* aufgeführten Arten habe ich, ausser sehr wenigen mit † bezeichneten, nach den Originalien selbst beschrieben.

ORIGINAL DESCRIPTION OF CULEX FLAVIPES:

Fuscus; capite thoraceque squamis auratis; alis flavicantibus, squamis flavis.

Long. 2 1/2 l. ♀.

Trompe brunâtre. Abdomen jaune (privé d'écailles), pieds d'un fauve pâle.

Du Chili (Concepcion), rapporté par M. Durville. Muséum.

Cet individu, presqu'entièrement privé de ses écailles, se rapproche du *C. pipiens*.

ORIGINAL DESCRIPTION OF CULEX CUBENSIS:

Culex. *Pallide flavus, capite flavo; oculis piceis; antennis flavis, pilis flavicantibus; thorace, duabus vittis ferrugineis, abdomine pallide flavo, incisuris obscurioribus, pedibus pallide flavis; incisuris tarsisque dilute fuscis; alis hyalinis marginibus villosis.*—Longit. 4–6 millim.

Hállase en la coleccion de M. Guérin-Méneville.

Las descripciones demasiado concisas y las mas veces del todo insuficientes, dadas por los autores relativamente á los insectos del género CULEX, no nos permiten decedir con certeza si esta especie habia sido estudiada anteriormente, y en la duda, resolvemos á publicarla como neuva.

ORIGINAL DESCRIPTION OF CULEX PENAFIELI:

Culex sp. nov? ♂, ♀.—*Flavus, capite rufo, antennis fusconigris, palpis et rostri parte apicale fuscis, thoracis dorso ex flavo ferrugineo abdominis marginibus segmentorum singulorum posterioribus plus minusve luteis, femoribus apicem versus tibiis tarsisque fuscis; alae hyalinae, venis fuscotomentosis. Long. corp.* 6–7 mm.

ORIGINAL DESCRIPTION OF CULEX SKUSII:

Wings unspotted; tarsi uniformly coloured; thorax orange-brown, with four lines of golden hairs, as in *C. Bancroftii*. Abdominal segments violet-black, with narrow ochreous basal bands. Distinguished from the preceding by certain trifling differences of wing venation and its lighter colour. The resemblance to *C. ciliaris* appears much less marked.

Description from " S. A. C.," p. 1748.—Length of antennæ ♂ 2.14 mm.; ♀ 2.54 mm.; expanse of wings ♂ 4.06 × 1.01 mm.; ♀ 4.56 × 1.13 mm.; size of body ♂ 5.58 × 1.01 mm.; ♀ 5.58 × 1.18 mm.

♂ and ♀—Antennæ light brown; scapus ocherous, except apical half of second joint; in the ♂ more than three-fourths the length of the palpi, basal half of flagellar joints, saving the last whitish; in the ♀ somewhat longer than the proboscis. Head brown or ocherous brown (when denuded), densely clothed with golden hairs and scales. Proboscis ochre-brown scaled, dark violet at base and towards the end; in the ♀ about seven times the length of the palpi. Palpi of the ♂ light ochre-brown, with faintly violet scales, the fourth joint with a pale naked yellow ring at the base; in the ♀ violet-black-scaled. Thorax generally orange-brown, sometimes darker (when denuded) densely golden scaled, in fresh specimens, transversed by four fine naked lines, arranged as in *C. Bancroftii* (No. 14, p. 221); sides and back of thorax densely beset with long golden hairs; pleuræ orange-brown, frequently very pale, with a few small, often indistinct, white scaled patches; scutellum yellowish or brownish, golden scaled and fringed with long golden hairs; metanotum ochreous. Halteres pallid or ochre-yellow, the club more dusky. Abdomen more than twice the

Digitized by Google

length of the thorax in the ♂, shorter in the ♀; dorsally dark violet-scaled, each segment narrowly ochre-banded in front; venter whitish-scaled; external genitalia ochreous, densely haired. Legs violet-brown scaled, the femora with whitish scales, and slightly at the base, the latter and the tibiæ very slightly ochre-tipped; tibiæ and tarsi with a pale ochreous reflection beneath; coxæ brownish-yellow, with white scales. Wings longer than the abdomen, hyaline, veins densely violet-brown scaled. Auxiliary, joining the costa opposite the tip of the hinder branch of fifth longitudinal vein; middle about equal to the posterior transverse vein, placed twice the length of the latter in front of it; first sub-marginal longer, and somewhat narrower than the second posterior cell, its base opposite that of the latter in the ♂, slightly before it in the ♀; anterior branch of fifth longitudinal originating at a point nearer the origin of the second than to the tip of the sixth longitudinal vein.

Observation.—Individual specimens of this species apparently vary somewhat in colour, as nearly every reference to colour is in the original, expressed by several nearly synonymous words. Considerations of space render it impracticable to give these in full. The same remark applies to a less extent to many others of the species described by this author.

Habitat.—Widespread in Australia. Found in towns, throughout the year, but most annoying during the summer.

ORIGINAL DESCRIPTION OF CULEX QUASIPIPIENS:

Thorax brown, with narrow curved golden scales. Abdomen brown, with curved very pale yellow to white basal bands, last segment often pale scaled. Legs unbanded, brown; knee spot pale; ungues equal and simple. Wings much as in *C. pipiens*, but the stem of the first sub-marginal a little longer, and the posterior cross-vein considerably further off, and the relative positions of the sub-costal, costal, and the base of the first fork-cell different. Head with pale scales. Thoracic scales broader than in *C. pipiens*.

♀. Head deep brown, with very narrow grey curved scales on the occiput, and black upright forked scales, which form a black patch on each side near the neck, a narrow band of pale scales bordering the eyes, and a row of six bristles on each side projecting inwards and over the eyes; clypeus bright brown; palpi like *C. pipiens*, covered with black scales and black bristles; proboscis deep brown; antennae deep brown, basal joint chestnut-brown, base of the second joint testaceous.

Thorax deep brown, with narrow pale golden curved scales, which become paler in front of the scutellum; scutellum ochraceous-brown, with narrow curved scales and golden-brown border bristles; metanotum chestnut-brown; pleurae pale ochraceous.

Abdomen ochraceous, with deep brown scales and basal pale creamy bands curved from side to side; with thin rather long border-bristles and numerous long lateral brown hairs; venter pale ochraceous.

Legs unbanded, brown; coxae and venter of femora pallid; a pale indistinct spot at the apex of the femora and tibiae, especially noticeable on the apex of the hind tibiae; hind metatarsus a little longer than the hind tibia; ungues equal and simple.

Wings with venation differing from *Culex pipiens*, in that the base of the first sub-marginal cell is much nearer the apex of the wing than the junction of the sub-costal and costal.

Length.—5 mm.

Habitat.—Sambalpur, Central Provinces, India (Murphy) (99).

Observations.—Very like *C. pipiens*, but differing in wing venation and in the form of the head scales, which are smaller in this species and in the larger thoracic scales.

ORIGINAL DESCRIPTION OF CULEX FOUCHOWENSIS:

Thorax dark brown, with narrow curved dull golden scales. Abdomen deep brown, almost black, with basal dull white bands. Legs unbanded, dark brown; hind metatarsus much longer than the hind tibia. Wings with brown scales, the lateral ones linear and very dense, venation as in *fatigans*. Border-bristles of abdominal segments alternately long and short. Ungues of the female equal and simple.

♀. Head dark brown, with narrow golden curved scales in the middle, becoming paler at the sides, which are covered with flat white scales, a narrow-white-scaled border surrounds the eyes, on each side of the occiput is a patch of black upright forked bristles and some ochraceous ones between; clypeus, palpi, antennae and proboscis deep brown, the antennae with deep brown basal joint and pale pubescence; palpi short.

Thorax deep brown, covered with short, scattered, very narrow curved golden-brown scales, most dense and rather brighter on the anterior border of the meso-

Digitized by Google

thorax; scutellum blackish, with narrow pale curved scales and deep brown border bristles; metanotum deep black; pleurae black, with patches of white scales.

Abdomen steely-black, with basal pale creamy-yellow bands, the rest of the abdomen covered with dusky-black scales; border bristles pale, *alternately short and long;* numerous long lateral hairs also present; venter, with the bases of the segments, broadly banded with pale ochraceous.

Legs deep brown, almost black, with a small white knee spot; ochraceous when denuded; hind metatarsus considerably longer than the hind tibia; ungues equal and simple.

Wings with the veins covered with small brown median scales and dense long lateral ones; first sub-marginal cell much longer and narrower than the second posterior cell; its base nearer the base of the wing than that of the latter, its stem equal to nearly half the length of the cell, considerably shorter than the stem of the second posterior cell, which is longer than the cell; posterior cross-vein about two and a half times its own length distant from the mid cross-vein; sub-costal joins the costal nearer the apex of the wing than the base of the first sub-marginal; black bristles close to the base of the first long vein.

Halteres ochraceous-brown.

Length.—3.8 to 4 mm.

♂. Head as in the ♀; palpi dark brown, the last two joints nearly equal, the penultimate joint and the base of the apical joint pure white scaled below, there is also a pale yellow band towards the base; the last two joints and apex of the ante-penultimate joint with short rather thick black hairs; antennae banded black and white, the two long apical joints dark brown; plume hairs deep brown; proboscis brown, quite black towards the tip.

Thorax as in the ♀.

Abdomen with basal pale creamy bands, that on the seventh expanding laterally; densely hairy.

Legs as in the female; fore ungues unequal, both uniserrated, those of the mid legs the same, but the larger one more curved; those of the hind legs very small, equal and simple.

Length.—3.5 mm.

Habitat.—Fou Chow (Rennie) (84).

Time of capture.—August.

Observations.—A very obscure species, but I think quite distinct. It comes near *C. fatigans*, Wiedemann, but the thorax has no linear stripes and the abdomen is much blacker.

ORIGINAL DESCRIPTION OF CULEX FATIGANS SUBSPECIES LUTEOANNULATUS:

Abdomen dusky black or brown, with basal flaxen curved bands and pure-white lateral spots; pleurae and metanotum chestnut-brown; thorax with traces of two parallel bare median lines.

ORIGINAL DESCRIPTION OF CULEX FATIGANS SUBSPECIES MACLEAYI:

Abdomen brown, with basal pale flaxen to almost white bands and white lateral spots; thorax with two very clear median parallel bare lines in front, *widening out* towards the fore end.

ORIGINAL DESCRIPTION OF CULEX FATIGANS SUBSPECIES TRILINEATUS:

In which the median line of dark thoracic bristles shows as a third median line on the thorax.

ORIGINAL DESCRIPTION OF CULEX OSAKAENSIS (male only):

. . . . [Palpi] of ♂ all dark brown.

♂. Palpi acuminate deep brown apically, considerably longer than the proboscis, the apical segment longer than the penultimate, both with brownish-black scanty hair-tufts, the two apical segments about two-thirds the length of the penultimate; antennae brown and white banded, plume-hairs brown, second and few following segments rather large. Fore and mid ungues unequal, both uniserrate, hind equal and simple.

Wings with the scales scantier and rather broader than the ♀; first sub-marginal cell longer and narrower than the second posterior, its base nearer the base of the wing, its stem less than one-third the length of the cell; stem of the second posterior three-fourths the length of the cell; posterior cross-vein twice its own length distant from the mid; the supernumerary cross-vein slopes at a prominent angle to the mid as in the ♀.

Genitalia with long narrowish basal lobes, bluntly acuminate, claspers short, curved and broadish, not half the length of the basal lobe; terminal segment short and rather broad; lateral process of the basal lobe with three large and broad spines,

Digitized by Google

then three smaller ones, then the foliate plate, and then a single spine; the first large spine is thick and ends bluntly, sword-like, the second is longer, curved apically and tapering, the third is much thinner than the other two, of the three smaller ones one seems larger than the other two but no longer; harpes small and sickle-shaped; harpagones small, dark, claw-like; setaceous lobes sessile, with many spines on the apex and sides, of a black colour.

Length.—5.8 to 6 mm.

Habitat.—Osaka, Japan.

Observations.— . . . . [It differs from *Culex fatigans*] in the male palpi being much longer than the proboscis, in the marked male genitalia. . . . the stalked setaceous lobes of the male genitalia are also very characteristic.

ORIGINAL DESCRIPTION OF CULEX CHRISTOPHERSII:

Head dark, speckled with pale dull yellowish scales, paler at the sides and around the eyes, and a dark patch noticeable on each side; palpi and proboscis deep brown. Thorax clothed with dull pale yellowish scales with two median bare lines and a rich brown spot on each side on the anterior half; pleurae pale greyish white, scutellum very pale. Abdomen brown with basal pale creamy curved bands. Legs brown, unbanded, base and under side of femora pale, also knee spot and apex of hind tibiae. Male palpi brown, acuminate, unbanded.

♀. Head brown, clothed with small narrow-curved pale yellowish scales on the occiput, flat white ones laterally, upright ochraceous forked scales in the middle and a patch of black ones on each side, which form the dark lateral spots noticed with a hand lens. Palpi and proboscis deep brown, the latter with testaceous labellae. Antennae brown, basal segment yellowish. Palpi three-jointed, the two basal segments small, the apical one large.

Thorax brown, clothed with narrow-curved pale dull golden scales almost creamy in some lights and a rich brown scaled roundish area on each side in front, not very noticeable under the microscope as it is under a hand lens; scutellum very pallid and the small almost translucent scales of a pale creamy grey; the mid lobe with six prominent dark border-bristles; the chaetae of the posterior area of the mesonotum are very noticeable owing to the integument and scales becoming very pale before the scutellum, being almost uniform in colour with it; metanotum pale ochreous; pleurae very pallid, with some flat white scales.

Abdomen brown, clothed with deep brown scales with dull violet reflections and with curved basal creamy yellow bands and pale basal lateral spots, venter creamy yellow; basal segment testaceous with some dusky scales in the middle; hairs brown with golden reflections.

Legs brown, unbanded, the femora at the base and beneath, especially of the hind legs white, a small pale knee spot to the hind legs and also a pale spot at the apex of the tibiae; ungues small, curved, equal and simple.

Wings with moderately long fork-cells, the first sub-marginal longer and narrower than the second posterior cell, its base slightly nearer the base of the wing than that of the latter, in length about two and a half times that of the stem; stem of the second fork-cell not quite as long as the cell; posterior cross-vein shorter than the mid, about three times its own length distant from it. Halteres pale ochraceous.

Length.—4.5 to 5 mm.

♂. Palpi acuminate brown, the last two segments deep brown and also the apex of the antepenultimate, the last two segments of nearly equal length, with a few long black hairs which also pass to the apex of the antepenultimate segment, but which barely can be called hair-tufts. Proboscis brown, dark at the apex and swollen. Ungues of fore and mid legs unequal, uniserrate, of the hind legs equal and simple.

Length.—4.5 mm.

Habitat.—India (Dr. Christophers).

Observations.—Described from several ♀'s and a ♂ sent to the Museum by Dr. Christophers. It is a somewhat obscure species, the thoracic ornamentation not always being very noticeable. The best character to identify it by is the presence of the black patches of forked scales on the head, in conjunction with the thoracic adornment and banded abdomen it should thus be fairly easy to distinguish.

There is considerable variation in the number of scutellar chaetae and in the relative length of the fork-cells and their stems.

ORIGINAL DESCRIPTION OF CULEX AIKENII:

Female.—Unknown.

Male.—Proboscis long and slender, the apical portion somewhat stouter, clothed with brownish and grayish scales, giving a mottled effect, without light ring; palpi very long and slender, slightly thickened in their apical halves, clothed with brownish

Digitized by Google

scales and mottled with grayish ones; the second segment with a broad white ring before the middle; apical half of the palpi clothed with long hairs; occiput clothed with gray and pale brown scales, the margin of the eyes white-scaled, the usual upright dark forked scales; mesonotum clothed with light yellow-brown and grayish scales, without distinct lines or pattern; abdomen dusky-scaled above, the segments broadly banded with white basally; on the sixth and seventh segments the bands extend along the lateral margins to the apices of the segments; eighth mostly black-scaled above; beneath the abdomen is light-scaled without bands, ciliation of the abdominal margin pale, long, and abundant; veins of the wings clothed with pale brownish long and narrow scales, those along the costa black; legs blackish-scaled, with lighter mottling on the femora and tibiæ; the tarsi show a faint bronzy luster and are not ringed; under surfaces of the femora pale-scaled; tibiæ paler scaled on the inner side. Length, 3 mm.

Three specimens, New Amsterdam, Dutch Guiana, February 17, 1908 (Dr. J. Aiken).

Type.—Cat. No. 11977, U. S. N. M.

We realize the undesirability of describing species of *Culex* from the male sex alone, on account of the difficulty of ever associating the proper female; but in this case Doctor Aiken has communicated to us the larva, which makes future identification of the female easy. The larva is almost the exact counterpart of our *Culex regulator*, described from Santo Domingo, but the male adult differs strikingly from the male of *regulator*, so that there is no question but that the two forms are distinct species. It is proper to state that the larva sent us by Doctor Aiken is a whole larva, not the skin from a bred specimen, and therefore the authority for the association rests with him.

Named for Dr. J. Aiken, who collected the specimens and has kindly sent us a series of species from Dutch Guiana.

ORIGINAL DESCRIPTION OF CULEX QUINQUEFASCIATUS RACE DIPSETICUS:

. . . . . In . . . . parts of the United States and the western coast of Mexico a modified form of genitalia is seen, representing a distinct race of the species. We are not acquainted with the line of separation of the forms, as our material is insufficient. Our specimens of the race, for which we propose the name *dipseticus*, are from Indio and Coachella, Cal. (in the Salton Sink), La Paz, Baja California, Acapulpco and Salina Cruz, Mexico. . . . . .

In the genitalia of the race *dipseticus*, the first branch of the harpagones is not especially elongated. The other characters remain essentially the same, including the flat and pointed condition of the second plate.

Type—No. of the race *dipseticus*, 12229, U. S. Nat. Mus.

ORIGINAL DESCRIPTION OF CULEX GOUGHII (male only):

Male.—Head dark brown, clothed with narrow-curved pale scales and small flat pale lateral ones, black upright forked scales behind; antennae banded brown and grey with brown plume hairs, flaxen at the base; palpi deep brown, acuminate, last two segments nearly equal, with black hairs, also the apical region of the antepenultimate, a pale band near the base of the palpi and the penultimate segment with a line of white scales beneath, and some beneath at base of the apical one.

Thorax deep brown with golden brown scales, pales behind and black chaetae; scutellum pale brown, like the neighbouring region of the metanotum, and with narrow-curved pale scales and deep brown border bristles, seven to the mid lobe; metanotum pale ochreous brown.

Abdomen with the first segment dark, nude except for two small patches of black scales, with long pale brown hairs on each side, shorter ones in the middle; second segment black with a small median basal triangular white spot, third, fourth, and fifth segments with basal creamy bands, the sixth and seventh with the bands spreading down each side to the posterior borders of the segments, eighth segment with basal lateral creamy spots only; hairs, long, dense, golden.

Legs deep brown, femora grey beneath, knee spot pale and small, a pale apex to hind tibiae, fore and mid ungues unequal, uniserrate, hind equal and simple.

Wings with the first fork-cell longer and narrower than the second fork-cell, its base nearer the base of the wing, its stem nearly half the length of the cell, stem of the second fork-cell as long as the cell; posterior cross-vein about one-and-a-half times its own length distant from the mid cross-vein.

Length.—4.5 mm.

Habitat.—Onderstepoort (Dr. Theiler).

Observations.— . . . . one male . . . . A rather obscure species of *fatigans* type, but can be easily told . . . . by the white scaled line on the palpi, which is ventral and very marked in the male.

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX QUINQUEFASCIATUS:

Female.—Proboscis moderate, uniform, labellæ conically tapered; vestiture black, with a whitish shade beneath; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth the length of proboscis, uniform, clothed with blackish scales, setæ at base long, outstanding. Antennæ moderate, joints subequal, rugose, pilose, blackish, second joint scarcely enlarged; tori subspherical with a cup-shaped apical excavation, yellowish shading to dark brown on inner side. Clypeus rounded triangular, convex, brownish black, nude, slightly pruinose. Eyes black. Occiput brown, clothed with narrow, curved scales, pale brownish on vertex, yellowish white on sides and along margins of eyes, numerous erect, forked scales, yellowish white on vertex, black on sides.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with a few narrow pale scales and brown bristles. Mesonotum dark brown, with two narrow, impressed, dorsal bare lines, clothed with narrow, curved pale-bronzy scales with a brassy luster and numerous brown bristles. Scutellum trilobate, luteous, clothed with narrow pale scales, each lobe with a tuft of brown bristles. Postnotum elliptical, brown, nude. Pleuræ and coxæ pale luteous, clothed with patches of flat white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip, clothed with blackish scales dorsally, which have a slight bluish reflection; first segment with a patch of whitish scales in the middle and with many pale hairs; each of the succeeding segments with a basal transverse band of yellowish-white scales, each band widest in middle, those on first four segments distinctly triangular and separated from lateral spots; a row of lateral basal segmentary triangular white spots; seventh segment white scaled along sides, last entirely yellowish-white scaled; venter clothed with yellowish-white scales, membrane beneath dark; ends of segments with yellowish, rather long hairs, abundant at tip.

Wings moderate, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell about as long as its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; scales of veins dark brown with a blue luster on costa, rather broadly linear. Halteres whitish with brown knobs.

Legs moderate, uniform; femora clothed above with black scales with a bluish and bronzy luster, beneath broadly white to tips; knees and tips of hind tibiæ whitish; tibiæ and tarsi black scaled with pale-brassy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4.5 mm.

Male.—Proboscis straight, gradually enlarged towards apex, with an indistinct broad pale ring beyond middle, underside pale scaled throughout. Palpi exceeding proboscis by the length of the last joint, slender, uniform, the apical portions slightly enlarged; vestiture black with pale scales intermixed on long joint, a white ring at basal third of long joint, a patch of white scales at bases of last two joints beneath, abundant long black hairs at end of long joint and on last two. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black enlarged rings at insertion of hair-whorls; hairs long, black; tori entirely brown. Coloration similar to the female. Abdomen elongate, depressed, dorsally with a stronger metallic reflection, basal bands broadened at sides, not triangular, reaching margin, those on sixth and seventh segments expanded laterally, last segment entirely pale scaled, lateral ciliation pale, abundant. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Front tarsi with the last joint curved and with a projection at base. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Digitized by Google

Genitalia (plate 18, figs. 128 and 129): Side-pieces over twice as long as wide, tips rounded with a quadrate apical projection bearing a spine, three curved rods with hooked tips, a leaf-like appendage and three setæ; clasp-filament moderate, slender with a terminal articulated spine. Harpes divided, inner branch bearing large tuft of spines at tip, outer short and curved; harpagones divided, one branch forming a long, curved, spatulate process far exceeding spinose tips of harpes. Unci obscured. Basal appendages, short, remote, setose.

Larva, Stage IV (see the figure of the entire larva, plate 54).—Head rounded, widest through eyes, narrowed before, a notch at insertion of antennæ, front margin arcuate; antennæ rather large, spined on basal two-thirds, with a large tuft from a notch, apex obliquely truncate and with three long setæ, a short one and a digit; both pairs of dorsal head-hairs and ante-antennal tufts multiple. Mental plate triangular with a projecting central tooth and eleven on each side, basal ones a little larger and more remote, last one small. Mandible quadrangular, with four filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of transverse prominences on outer margin bearing hair-tufts; dentition of four teeth on a process, first longest; a spine before, a small tooth and a large trifid one at base, a serrate filament and row of feathered hairs within; process below slightly curved, obscurely furcate, with a transverse and longitudinal row of hairs and a tuft at tip of each limb; basal angle large with a row of stout hairs within; a row of long hairs at base. Maxilla elongate, conical without, divided by a suture; inner half with a row of long spines along margin, the basal ones feathered, three rows of cilia within, a row of long hairs at tip, running down along the suture; outer half with two filaments near middle, a few hairs below, a spine on other side and minute teeth on margin. Palpus very small with four irregular apical digits, one of which is long. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs multiple on first two segments, in twos on third to sixth; subdorsal hairs single on third and fourth segments; tracheæ rather broad. Air-tube rather stout, tapered on outer half, four times as long as wide; pecten running about one-third; single tooth broad with three to six branches; four tufts on posterior margin, the subapical one moved laterally out of line. Lateral comb of eighth segment of many spines in a triangular patch; single spine narrow, apex rounded and fringed with spinules. Anal segment a little longer than wide, ringed by the plate; dorsal tuft a group of three long hairs on each side; a single lateral hair; ventral brush well developed, confined to the barred area. Anal gills rather short and broad, longer than the segment, tapered toward tips.

Variety dipeeticus Dyar & Knab.

This race occurs in the arid region along the west coast of Mexico, from the mouth of the Colorado River southward. The adults do not differ in markings from the normal form, but the genitalia of the male differ in the much shorter branch of the harpagones (plate 18, fig. 130), which does not extend like a ribbon in the manner characteristic of typical *quinquefasciatus*. Our specimens are from La Paz, Baja California, Mexico (A. Dugès); Acapulco, Mexico, July 28, 1905 (F. Knab); Salina Cruz, Mexico (A. Dugès); Salina Cruz, Mexico, July 12, 1905 (F. Knab).

Culex quinquefasciatus is widely distributed throughout the warmer portions of the globe. It is distinctly a domestic species, and, while it does not show the same degree of adaptation to man as *Aëdes calopus*, it is clearly an associate of man. It is very bloodthirsty and a source of great annoyance, not only by its irritating bite, but as well by its song. It is strictly nocturnal and will bite in complete darkness. It is probable that the female requires blood for the maturation of her eggs. Undoubtedly the same female will suck blood repeatedly, with

Digitized by Google

intervals for digestion. The males feed on sugar and other sweet substances and are attracted to beer, wine and other liquids. The species thrives only in the vicinity of man. This species is the principal one concerned in the transmission of *Filaria bancrofti*, which produces filarial disease in man. It is probably the only mosquito to be considered in the control of this disease. *Culex quinquefasciatus* is also the transmitter of Dengue fever, a disease of man in warmer climates. It is further known as the transmitter of certain malarial parasites peculiar to birds. The males are generally stated to be very short-lived but Goeldi has kept males alive on a diet of honey from 53 to 56 days.

The distribution of *Culex quinquefasciatus* is a tropical and subtropical one, its known range in the United States extending as far north as Washington and St. Louis. It is not known whether the females hibernate at these extremes of its range or whether the species is reintroduced each season. In the southern part of our region it replaces *Culex pipiens* entirely; but in intermediate latitudes, for instance that of Washington, District of Columbia, the two species occur intermixed in rain-barrels, also associated with *Culex restuans* and *Culex salinarius*. In warm summers, and toward the end of the season, *Culex quinquefasciatus* predominates in this latitude (Washington), and is the species so troublesome in our parks and houses in August and September. The larvæ probably breed in the catch-basins at the corners of the streets.

In the tropics the adults swarm for mating inside the house. Mr. Schwarz observed the species in Cuba. The swarming occurred in the house, always on the side away from the sun, and when it was almost fully dark. The mosquitoes could be seen only against the sky, when between the observer and the open doors or windows, and close observation was impossible under the circumstances. The swarms comprised both sexes, copulation taking place. A capture of 60 specimens from such a swarm contained 44 males and 16 females.

We translate the following description of the mating habits from Dr. Goeldi's work:

"The swarms of mosquitoes which one observes at nightfall, entering the house by the windows and filling our rooms with a solemn hum, are to be explained in the same manner [*i. e.*, like the marriage-flights of ants, bees, etc.]; they are thus celebrating their orgies and bacchanals. It is principally the males which at that time invade the house, united in swarms of 50 to 100 or more individuals, condensed into a compact cloud, in order to find the females which they know or surmise to exist there. Who has not been a spectator of the scene which presents itself when we enter a dark room at the time indicated?

"An infernal music of innumerable mosquitoes assails our ears, while at every moment one and another strikes against our face with disgusting and provoking impudence. Striking a light we perceive, beyond the luminous area, the impish multitude dancing and cutting frantic capers; there are two clouds, each of which is composed of individuals of only one sex, which, fluttering and describing capricious evolutions, execute, by means of the sound produced by their wings and halteres, an orchestra or recitative chorus dominated by the baton of Eros.

"Whoever will take the trouble can quickly convince himself that there are two sounds, a higher one and another lower one; the first is produced by the males, the second by the females. . . .

"They sing because thus the two sexes make themselves known and recognize each other at some distance. Nothing is more destitute of ceremony than sexual union; some female suddenly disengages herself from her companions and approaches the cloud of dancing males. Immediately she is captured by a male and united the pair recedes from the indiscreet multitude. It is not rare that these

Digitized by Google

forget the most elementary prudence; they foolishly strike against everything and are liable to roll upon the ground.

"I also observed cases when a female fell, captured at the same time by two males, presenting the spectacle of a serious scramble, indication of the sexual frenzy which reigns at such bacchanals."

The eggs are laid in boat-shaped masses floating on the surface of the water. Goeldi, at Pará, found the number of eggs in two egg-rafts to be 225 and 270 respectively. C. S. Banks, in the Philippines, found the number of eggs in a single mass to vary from 180 to 350. His figures show that there are from 6 to 9 rows of eggs in a raft, 7 or 8 being the usual number. The eggs hatch after from one to three days.

The species breeds most frequently in artificial receptacles, but also in ground-pools in the vicinity of habitations when the water is sufficiently polluted. The species thrives best in water charged with animal matter and shows a preference for filthy water. Goeldi found that the eggs were being deposited in great numbers in vessels in which the bones of animals were being macerated and he believed that the large amount of animal matter in this water induced the females to oviposit in unusual numbers. Breeding goes on continuously while conditions are favorable. Under the most favorable conditions the larvæ may reach maturity within five or six days and the pupal period may be as short as two days or less.

Southern United States, Mexico, Central America and the West Indies and the warmer parts of South America; also the warmer regions of the Old World, Mediterranean region, Nile valley, coasts of Africa, southern Asia, East Indies, Australia, and some of the Pacific islands.

Washington, District of Columbia, November 4, 1903 (W. V. Warner); Alexandria, Virginia, September 23, 1899 (F. C. Pratt); Augusta, Georgia, August 8, 1901 (W. Reed); Cincinnati, Ohio, September 21 (T. H. C.); Columbia, South Carolina, September 12, 1908 (W. H. Sligh); Myrtle, Georgia, August 26, 1906 (A. A. Girault); Orlando, Florida, November 25, 1908 (E. A. Back); Key West, Florida, June 7, 1903 (E. A. Schwarz); Jacksonville, Florida, June 20, 1906 (H. Byrd); Hastings, Florida, July 19, 1899; Magnolia Springs, Florida, April 2, 1901 (F. J. Matheson); New Smyrna, Florida (Dyar & Caudell); Tampa, Florida (Dyar & Caudell); Richmond, Kentucky, August 25, 1904 (H. S. Barber); Lexington, Kentucky, October 19, 1901 (A. M. Miller); Winchester, Kentucky, August 25, 1904 (H. S. Barber); Columbia, Tennessee, August 16, 1904 (H. S. Barber); Knoxville, Tennessee, August 28, 1901 (S. R. Miller); Athens, Tennessee, August 22, 1904 (H. S. Barber); Rivers, Tennessee, July 25, 1904 (H. S. Barber); Chattanooga, Tennessee, August 20, 1904 (H. S. Barber); Magnolia, Mississippi, July 19, 1901 (G. W. Herrick); Clarksdale, Mississippi, August 1, 1904 (H. S. Barber); Belzona, Mississippi, August 5, 1904 (H. S. Barber); Agricultural College, Mississippi, October 29, 1900 (G. W. Herrick); Jackson, Mississippi, August 7, 1904 (H. S. Barber); Corinth, Mississippi, August 14, 1904 (H. S. Barber); Baton Rouge, Louisiana (J. W. Dupree); Baton Rouge, Louisiana, December 5, 1904 (E. S. G. Titus); New Orleans, Louisiana, December 17, 1895 (L. O. Howard); Ruddock, Louisiana, May 10, 1901 (C. N. Burton); Cairo, Illinois, July 25, 1904 (H. S. Barber); St. Louis, Missouri, May 13, 1906 (Captain Chamberlain); Lawrence, Kansas, July (E. S. Tucker); Hot Springs, Arkansas, October 1, 1900 (A. Wright); Scott, Pulaski County, Arkansas, August 13, 1909 (J. K. Thibault, Jr.); Helena, Arkansas, July 30, 1904 (H. S. Barber); Corpus Christi, Texas, October 20, 1905 (F. C. Pratt); Llano, Texas, August 3 (W. D. Hunter); Trinity, Texas, August 9, 1906 (F. C. Bishopp); Dallas, Texas,

Digitized by Google

November 11, 1905 (W. S. Hinds); Victoria, Texas, October 10, 1904 (E. G. Hinds); Clark, Texas (through C. S. Ludlow); Laredo, Texas, April 21, 1904 (A. W. Morrill); Brownwood, Texas, October 5, 1905 (W. D. Pierce); Denison, Texas, June 23, 1904 (H. S. Barber); Greenville, Texas, June 29, 1904 (H. S. Barber); Paris, Texas, June 11, 1904 (A. A. Girault); Galveston, Texas, September 30, 1901 (J. T. Moore); San Diego, Texas, May 21, 1901 (W. D. Hunter); Kerrville, Texas, May 30, 1906 (F. C. Pratt); Fort Yuma, Arizona (E. E. Wilcox); Coachella, California, June 9, 1906 (A. N. Caudell); Indio, California, June 10, 1906 (A. N. Caudell); Durango, Mexico, November 26, 1909 (E. A. Schwarz); Guanajuato, Mexico, October 4, 1900 (A. Dugès); Salvatierra, Mexico (A. Dugès); Zihuatanejo, Mexico (A. Dugès); San Blas, Mexico (A. Dugès); Leon, Mexico (A. Dugès); Mexico City, Mexico, December, 1909 (A. L. Herrera); Tampico, Mexico (J. Goldberger); Córdoba, Mexico, May 10 (L. O. Howard); Córdoba, Mexico, June, 1905, January to May, 1908 (F. Knab); Rincon Antonio, Mexico, June 24, 1905 (F. Knab); La Paz, Baja, California (A. Dugès); Mazatlan, Mexico (A. Dugès); Acapulco, Mexico, July 28, 1905 (F. Knab); Salina Cruz, Mexico, July 12, 1905 (F. Knab); Tehuantepec, Mexico, July 1, 1905 (F. Knab); Coatzacoalcos, Mexico (A. Dugès); Laguna del Carmen, Mexico (A. Dugès); San José, Guatemala, August 6, 1905 (F. Knab); Escuintla, Guatemala, August 8, 1905 (F. Knab); Guatemala City, Guatemala, September, 1902 (G. Eisen); Acajutla, Salvador, August 28, 1905 (F. Knab); Sonsonate, Salvador, August, 1905 (F. Knab); Zent, Costa Rica, September 26, 1905 (F. Knab); San José, Costa Rica, September 21, 1905 (F. Knab); Port Limon, Costa Rica; Steamer *Algiers*, at sea from Port Limon, Costa Rica; Bluefields, Nicaragua, November, 1900 (L. A. Wailes); Puerto Barrios, Guatemala; Livingston, Guatemala, March 20, 1906 (E. A. Schwarz & H. S. Barber); Belize, British Honduras (R. H. Peters); Ancon, Canal Zone, Panama (A. H. Jennings); La Boca, Canal Zone, Panama, May 22, 1907 (A. Busck); Las Cascadas, Canal Zone, Panama, July 24, 1907 (A. Busck); Taboga Island, Panama Bay, Panama, July 4, 1907 (A. H. Jennings); Empire, Canal Zone, Panama (A. H. Jennings); Spanish Wells, Bahama Islands, July 4, 1903 (T. H. Coffin); Nassau, Bahama Islands, July 2, 1903 (T. H. Coffin); Tarpum Bay, Bahama Islands, July 7, 1903 (T. H. Coffin); Havana, Cuba, October and January 20, 1904 (J. R. Taylor); Cardenas, Cuba, June 13 (E. A. Schwarz); Columbia Barracks, Cuba, December 30, 1901 (R. A. Amador); Guantanamo, Cuba, July 26, 1901 (J. M. Espin); Cayamas, Cuba, May 20, (E. A. Schwarz); San Antonio de los Baños, Cuba (J. H. Pazos); Pinar del Rio, Cuba; Baracoa, Cuba, September, 1901 (A. Busck); Santiago, Cuba (through C. S. Ludlow); Matanzas, Cuba, March 20 (E. A. Schwarz); Quemados, Cuba (————); Mayaguez, Porto Rico (W. V. Tower); Vieques Island, Porto Rico, July 31, 1910 (C. C. Craft); Guayama, Porto Rico, April 9, 10, 1901 (R. A. Pearson); Santo Domingo City, Santo Domingo, August 7, 1905 (A. Busck); St. Thomas, Virgin Islands, August 1, 1905 (A. Busck); Dominica, July 28, 1905 (A. Busck); La Martine, Martinique, July 27, 1905 (A. Busck); Fort de France, Martinique, July 20, 1905 (A. Busck); Barbados, July 15, 1905 (A. Busck); St. Vincent, July 14, 1905 (A. Busck); Plymouth, Montserrat, April 10, 1902 (F. Driver); Basse Terre, Guadeloupe, July, 1905 (A. Busck); Cedros, Trinidad, June 18, 1905 (A. Busck); Montserrat, Trinidad, June 29, 1905 (A. Busck); Guayaquil, Eucador (F. Campos); New Amsterdam, British Guiana, May, 1907 (J. Aiken); Omai, British Guiana (K. S. Wise); Berbice, British Guiana, February 17, 1908 (J. Aiken); Maceió, State of Alagoas, Brazil, December, 1911 (G. A. Waring); Rio de Janeiro, Brazil, December 12, 1910 (C. C. Craft); Campinas, Brazil, January 22, 1902 (A. Hempel); Lourenço Mar-

Digitized by Google

ques, Portuguese East Africa (C. W. Howard); Hilo, Hawaii, April 5, 1902 (H. W. Henshaw); Honolulu, Oahu, June 5, 1906 (C. S. Barber); Apia, Samoa, January and February, 1905 (J. T. Lloyd); Iloilo, Philippine Islands, August 30, 1904 (G. W. McCoy); Manila, Philippine Islands, February 13 (through C. S. Ludlow); Calcutta, India (A. Alcock). The species is reported also from Bermuda (Verrill), the islands of Jamaica, St. Kitts, Santa Lucia, Carriacou, and Grenada (Theobald), the Argentine (Arribálzaga), Chile (Macquart), from many localities in Africa, Zanzibar, Mauritius, Seychelles, Madagascar, the Mediterranean region, the East Indies, China, Japan, Fiji Islands, and the east and south coasts of Australia (Theobald).

This species has been treated by Theobald and those following him as *Culex fatigans* of Wiedemann, its range considered to embrace the warmer parts of the eastern hemisphere as well the American continent and islands. Several species have undoubtedly been included under this name, and the matter stands in some confusion. However an examination of mounts of the male genitalia of specimens from India and the Philippines proves that the species really has the distribution indicated by Theobald. The species is thus as widely spread as *Aëdes calopus,* and is, next to it, the most characteristic domestic mosquito of the tropical and subtropical parts of the globe.

Say described *Culex quinquefasciatus* in 1823, and this appears to be the earliest name we can assign to the species with any certainty. Wiedemann, in 1828, renamed the species *Anopheles ferruginosus,* apparently based upon some of Say's original specimens, which he says he received. In 1905, the senior author examined these specimens in the Naturhistorische Hofmuseum in Vienna and found that they belonged to *Culex;* Coquillett has already pointed out that Say's statement that the legs of this species are much shorter than those of *Anopheles punctipennis* likewise indicates a *Culex.* In the same work, Wiedemann also described *Culex pungens,* which is undoubtedly the same species, but not the *Culex pungens* previously described by Robineau-Desvoidy. He also described *Culex fatigans* from a different locality. In 1857, Bigot described *Culex cubensis,* adding another name to the synonymy. Finally Williston published a Latin diagnosis, to which he later attached the name *Culex peñafieli.* The description is inadequate, but we infer from the locality and manner of occurrence that the species was our ubiquitous *Culex quinquefasciatus.* The types of Williston's species are, we have been told, in the collection of the University of Kansas, but we have been unable to have them located, probably because the specimens are unlabelled.

We consider it quite probable Germar's *Culex domesticus* (Reise nach Dalmatien und in das Gebiet von Ragusa, 290, 1817) will prove to be identical with the present species. The description itself is unrecognizable, but his statement that the species is abundant in houses, and that it bites more severely than *Culex pipiens,* inclines us to this belief. However, without sufficient European material for study, we are unwilling to decide this question. Should our suspicions be confirmed the name *domesticus* will have priority. *Culex domesticus* has been considered a synonym of *C. pipiens* by modern authors.

Culex flavipes Macquart is referred to the synonymy arbitrarily, upon probability. Its author, in the original description, acknowledged that his specimen was almost completely denuded. Giles has examined the type in the museum of the Jardin des Plantes in Paris and found it badly damaged and unrecognizable. There is little doubt that the species identified by Arribálzaga as *Culex flavipes* is the one under present consideration, for he expressly indicates that it is an associate of man. Theobald (Mon. Culic., ii, 149, 1901) treats *Culex*

Digitized by Google

flavipes as a distinct species and appears to have had several forms confused under this name. At all events his material did not include the form here considered, for he lays particular stress on the difference in the thoracic scales, which in his specimens were minute, as in *Culex similis*. We omit the synonymy indicated in connection with *C. flavipes* by Theobald and Blanchard (Les Moustiques, 358, 1905), as it seems to us to need further elucidation.

Goeldi figures what he calls *Culex fatigans* (Os Mosquitos no Pará, plate i, figs. 4 and 5), and, if his figures are correct, it is a different species from the one known to us. We are, however, reluctant to believe that this can be so, and would attribute the joining of the abdominal bands to the lateral spots, shown in his figure of the female, to an error, or to a variation that occasionally occurs. Everything else that he says about the common house-mosquito of Pará points to its being identical with our *Culex quinquefasciatus*.

Theobald refers Wiedemann's *Culex æstuans* (Aussereurop. zweifl. Insekten, i, 11, 1828) and Meigen's *Culex pallipes* (Syst. beschr. europ. zweifl. Ins., vii, 1, 1838) to the synonymy, but we are unable to see from the descriptions any special resemblance to *Culex quinquefasciatus*. We are consequently unwilling to accept this synonymy until verified by a study of the types. Those of *Culex pallipes* are still preserved, according to Blanchard, in the Museum of Paris, and those of *C. æstuans* still exist in Vienna.

Blanchard places *Culex anxifer* Bigot (Ann. Soc. Ent. France, ser. iii, vii, 117, pl. 2, fig. 1, 1859), from Madagascar, as a synonym of our species. The description and the figure are both unrecognizable and Coquerel, in the accompanying remarks, clearly had a number of species confused, while his account of the habits will not apply to *C. quinquefasciatus*.

The use of the name *Culex ciliaris* is traceable to Skuse who referred specimens to that species with a doubt. The identity of the true *Culex ciliaris* of Linnæus does not seem well established, but in no case can it be referred to the present species. Coquillett considered *Culex fatigans* identical with *Culex pipiens* and to his identification is traceable the employment of the latter name for the present species by various authors.

The adults described as *Culex aikenii*, subsequently changed to *Culex lachrimans* owing to preoccupation of the name, prove to be *Culex quinquefasciatus*. The larvæ were wrongly associated by the collector, and are found to be *Culex similis*, but their true adults represent a geographical race, as will be found discussed under *Culex similis*.

In general appearance *Culex quinquefasciatus* closely resembles the more northern *Culex pipiens* and on that account the two have been frequently confused. It averages larger, although there is considerable variation in size. It has a distinctly greyish appearance, the colors being brighter in *Culex pipiens*. This difference is particular pronounced in the thoracic vestiture which in *Culex pipiens* is a foxy red while in *C. quinquefasciatus* the greyish tint often gives it an almost mouldy appearance. These differences, however, can not be relied upon, as specimens of *quinquefasciatus* occur with the thorax foxy red; we have particularly noted this in the form from the west coast of Mexico (variety *dipseticus*). The females of *C. quinquefasciatus* may usually be recognized by the character of the abdominal banding, although this character is not absolutely reliable. In *Culex pipiens* all the bands are continuous and joined to the lateral spots while in *quinquefasciatus* the first two or three bands are usually interrupted at the sides, not joining the lateral spots, and more or less produced medianly. These differences can, of course, be determined only with well-pre-

Digitized by Google

served specimens and, as already stated, they are not absolutely reliable. In cases of doubt the male genitalia or the larvæ must be resorted to. The first abdominal segment may be dorsally either pale-scaled or dark-scaled, or with a mixture of both. The differences in wing venation indicated by Theobald we consider unreliable and misleading as we have been unable to discover any tangible difference between the two species in this respect. The varietal forms or subspecies formulated by Theobald also seem to us ill founded. The names *Culex quasipipiens, C. fouchowensis, C. osakaensis, C. christophersii* and *C. goughii*, all by Theobald, are placed in the synonymy on the authority of Mr. F. W. Edwards, who has examined the types in the British Museum (Bull. Ent. Res., iv, 55, 1913). He suggests that *Culex reesii* Theobald (Mon. Culic., ii, 145, 1901) and *C. sericeus* Theobald (Mon. Culic., ii, 147, 1901), of which he has not seen the types, are also referable here.

The present wide distribution of *Culex quinquefasciatus* is undoubtedly due to the agency of commerce. The species must have been confined originally to either the eastern or the western hemisphere and its introduction into the other half of the globe must have occurred within historic times. Formerly the arrangements on vessels offered abundant opportunities for the breeding of mosquitoes. We even have records of the introduction of mosquitoes, probably this species, into some of the Pacific islands which had, until then, been free from them (see Osten Sacken; Einführung von Mücken (Culex) auf den Sandwich-Inseln. Ent. Zeitung. Stettin, xxii, 51–52, 1861; also Van Dine and Kirkaldy). With the data at hand it is impossible to determine definitely whether *Culex quinquefasciatus* is of Old World or New World origin; we consider the latter the most probable because the species has developed a number of races or subspecies in America.

CULEX PIPIENS Linnæus.

Culex pipiens Linnæus, Syst. Nat., ed. x, 602, 1758.
Culex pipiens Linnæus, Syst. Nat., ed. xii, 1002, 1767.
Culex pipiens Fabricius, Sp. Ins., ii, 469, 1781.
Culex pipiens Schrank, Enum. Ins. Austriae indigen., 481, 1781.
Culex pipiens Fabricius, Mant. Ins., ii, 363, 1787.
Culex pipiens Herbst, Kurze Einleit. z. Kenntn. d. Ins., iii, 116, 1787.
Culex pipiens DeVillers, C. Linn. Ent., 562, 1789.
Culex pipiens Olivier, Encycl. Meth., vi, 133, 1791.
Culex pipiens Gmelin, Linn. Syst. Nat., ed. xiii, 2886, 1792.
Culex pipiens Fabricius, Ent. Syst., iv, 400, 1794.
Culex pipiens Schrank, Fauna Boica, iii, 166, 1803.
Culex pipiens Meigen, Klass. u. Beschr. eur. zweifl. Ins., 5, 9, 1804.
Culex pipiens Fabricius, Syst. Antiliat., 33, 1805.
Culex pipiens Latreille, Gen. Crust. et. Ins. sec. ord. nat. in fam. dis., iv, 246, 1809.
Culex pipiens Meigen, Syst. Beschr. bek. eur. zweifl. Ins., i, 7, 10, 1818.
Culex pipiens Macquart, Ins. Dipt. du nord de la France, i, 161, 1827.
Culex pipiens Robineau-Desvoidy, Mém. Soc. d'Hist. nat. Paris, iii, 408, 1827.
Culex consobrinus Robineau-Desvoidy, Mém. Soc. d'hist. nat. Paris, iii, 408, 1827.
Culex pipiens Meigen, Abbild. aller bis jetzt. bek. eur. zweifl. Ins., pl. ii, fig. 2, 1830.
Culex pipiens Macquart, Hist. nat. des Ins., Dipt., i, 34, 1834.
Culex pipiens Curtis, Brit. Entom., xii, no. 537, 2, 1835.
Culex pipiens Staeger, Naturh. Tidsskr., ii, 553, 1839.
Culex pipiens Gimmerthal, Bull. Soc. Imp. des Nat. de Moscou, xviii, 291, 1845.
Culex pipiens Walker, Cat. Dipt. Ins. Brit. Mus., i, 8, 1848.
Culex pipiens Gistel, Naturgesch. d. Thierreichs, 2 ed., 151, 1851.
Culex pipiens Walker, Ins. britt., pl. xxv, fig. 7, 1856.
Culex pipiens Schiner (in part), Fauna Austriaca, Die Fliegen, ii, 628, 1864.
Culex pipiens Rondani, Bull. della Soc. ent. Ital., iv, 30, 1872.
——— Westwood, Proc. Ent. Soc. Lond., p. xxxi, 1872.
Culex pipiens Müller (H.), Die Befrucht. d. Blumen d. Ins., 153, 198, 1873.
Culex pipiens Siebke, Enum. Ins. norvegic., fasc. iv, 192, 1877.

Digitized by Google

Culex pipiens Van der Wulp, Dipt. neerlandica, 328, 1877.
Culex pipiens Ficalbi, Bull. Soc. ent. Ital., xxi, 124, 1890.
Culex pipiens Ficalbi, Bull. Soc. ent. Ital., xxv, 141, 1893.
Culex hæmatophagus Ficalbi, Bull. Soc. ent. Ital., xxv, 143, 1893.
Culex pipiens Ficalbi, Bull. Soc. ent. Ital., xxviii, 287, 1896.
Culex hæmatophagus Ficalbi, Bull. Soc. ent. Ital., xxviii, 289, 1896.
Culex pipiens Sajo, Illust. Zeitsch. Ent., ii, 629, 1897.
Culex pipiens Ficalbi, Bull. Soc. ent. Ital., xxxi, 207, 1899.
Culex pipiens Giles, Handb. Gnats or Mosq., 324, 1900.
Culex hæmatophagus Giles, Handb. Gnats or Mosq., 325, 1900.
Culex pipiens Polaillon, Cont. à l'hist. nat. et med. des Moust., 68, 1901.
Culex pipiens Howard, Mosquitoes, 238, 1901.
Culex pipiens Theobald, Mon. Culic., i, 19; ii, 132, 1901.
Culex pipiens Grassi (in part), Studi . . . sulla Malaria, 2 ed., 10, 54, 1901.
Culex pipiens Giles, Gnats or Mosq., 2 ed., 437, 1902.
Culex pungens Smith (not Robineau-Desvoidy, not Wiedemann), Ent. News, xiii, 302, 1902.
Culex pipiens Dyar, Proc. Ent. Soc. Wash., v, 48, 1902.
Culex pipiens Sarmento & França, C. R. Soc. de Biol., liv, 153, 1902.
Culex pipiens Dyar, Science, n. s., xvi, 408, 672, 1902.
Culex pipiens Dyar, Journ. N. Y. Ent. Soc., x, 198, pl. xvii, fig. 3, 1902.
Culex pipiens Dyar, Proc. Ent. Soc. Wash., v, 144, 146, pl. ii, ff. 7, 8, 1903.
Culex pipiens Johannsen, Bull. 68, N. Y. State Mus., 416, 418, 1903.
Culex varioannulatus Theobald, Mon. Culic., iii, 198, 1903.
Culex azoriensis Theobald, Mon. Culic., iii, 210, 1903.
Culex pipiens Theobald, Mon. Culic., iii, 224, 1903.
Culex pipiens Smith, N. J. Agr. Exp. Stat., Bull. 171, 10, 1904.
Culex pipiens Felt, Bull. 79, N. Y. State Mus., 328, 1904.
Culex pipiens Knab, Journ. N. Y. Ent. Soc., xii, pl. x, fig. 12, 1904.
Culex pipiens Dyar, Journ. N. Y. Ent. Soc., xiii, 26, 1905.
Culex pipiens Blanchard, Les Moustiques, 340, 1905.
Culex pipiens Smith (in part), N. J. Agr. Exp. Stat., Rept. Mosq., 305, 1905.
Culex pipiens Felt, Bull. 97, N. Y. State Mus., 483, 1905.
Culex pipiens Davis, Entom. News, xvii, 369, 1906.
Culex pipiens Knab, Psyche, xiii, 123, 1906.
Culex pipiens Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 23, 1906.
Culex pipiens Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Culex pipiens Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 213, 1906.
Culex pipiens Austen, Ill. Brit. blood-suck. Flies, 25, pl. 8, 1906.
Culex osakaensis Theobald (in part), Mon. Culic., iv, 439, 1907.
Culex pipiens Knab, Journ. N. Y. Ent. Soc., xv, 215, 1907.
Culex pipiens Howard, Osler's Modern Medicine, i, 373, 1907.
Culex pipiens Viereck, 1 Rept. Comm. Health, Pa., 470, 1908.
Culex pipiens Smith (in part), N. J. Agric. Exper. Stat., Bull. 216, 4, 1908.
Culex pipiens Dyar & Knab, Proc. Ent. Soc. Wash., xi, 30, 1909.
Culex hæmatophagus Dyar & Knab, Proc. Ent. Soc. Wash., xi, 32, 1909.
Culex pipiens Schmitz, Tijdschr. voor Ent., lii, 79, 1909.
Culex quasiguiarti Theobald (in part), Mon. Culic., v, 374, 1910.
Culex pipiens Theobald, Mon. Culic., v, 381, 1910.
Culex pipiens Morse, Ann. Rept. N. J. State Mus., 1909, 720, 1910.
Culex pipiens de Meijere, Tijdschr. v. Ent., liv, 150, 1911.
Culex pipiens, var. *pipiens* Edwards, Bull. Ent. Res., ii, 263, 1911.
Culex pipiens Edwards, The Entomol., 1912, 263, 1912.
Culex pipiens Edwards, Bull. Ent. Res., iv, 53, 1913.

ORIGINAL DESCRIPTION OF CULEX PIPIENS:

pipiens. 1. C. cinereus, abdomine annulis fuscis octo. *Fn. svec.* 1116.
Fl. lapp. 363. 364.
Blank. ins. t. 15. *f. A–D.*
Reaum. ins. 4. *t.* 43, 44.
Swamm. quart. t. 23.
bibl. t. 31. *f.* 4–8. *t.* 32. *f.* 1–5.

Digitized by Google

Joblot. micr. 1. *pp.* 2. *t.* 13, *f. A. B. C. D. E. H. I. L.*

β. *Kalm. itin.* 2. *p.* 268, Musquetoës.

Habitat in Europæ *aquosis; copiosissima in* Lapponia; *etiam in* America *obvia. Kalm.*

Mas antennis plumosis vix pungit aut sugit sanguinem.

Larva in Aquis; Pupa bicornis reversa; Insectum pipiens, pungens: in Indiis magis venenata. Anseres allicit, pullos Gallinarum nutrit Lapponum *calamitas felicissima.*

ORIGINAL DESCRIPTION OF CULEX CONSOBRINUS:

Similimus praecedenti [*Culex pipiens*]; palpis, tarsisque bruneis.

Long. 3 lineas.

Omninò similis *Culici pipienti:* differt solùm palpis tarsisque brunicosis, non flavis.

Habitat in Pensylvaniâ. (Museum Dejeanianum.)

ORIGINAL DESCRIPTION OF CULEX HÆMATOPHAGUS:

Questa specie fu unanimemente accettata, e Meigen con questo nome consacrò la *zanzara comune ematofaga europea*, quale la trovava in Germania. Autori che scrissero di zanzare in questa o in quell'altra parte d'Europa ammisero sempre il *Culex pipiens*, che così si dovrebbe dire esteso dalla Lapponia (ove appunto Linneo per la prima volta descrisse la zanzara, che poi chiamò *pipiens*) alle parti meridionali d'Europa, Italia compresa, ove di *Culex pipiens* parlarono Rossi e Rondani.—Ma qualcuno si chiese se realmente la zanzara comune ematofaga europea, quale la descrive Meigen per la Germania, sia identica a quella pur chiamata *pipiens* da Linneo, delle regioni più nordiche di Europa, quali la Scandinavia e la Lapponia. Haliday diceva (e Westwood lo riporta) che la zanzara di Lapponia è il vero *Culex pipiens*, ed è confinata alle alte latitudini, non trovandosi in Inghilterra, ove pur molti elencarono il *C. pipiens*. Diceva che il *C. pipiens* di Meigen è specie perfettamente distinta dalla specie nordica. Walker scriveva che, se come Haliday ha supposto, la zanzara di Lapponia (descritta da Zetterstedt) è il vero *C. pipiens*, all'altra (quella cioè, europea, di Meigen) conviene cambiare nome. È vero che Zetterstedt, che fu grande ditterologo, non parla di queste distinzioni, e *Culex pipiens* chiama la zanzara comune di Lapponia e quella di Scandinavia, senza accennare a differenze con quella comune europea. Ma qualche nuovo studio sulla identità reale o falsa della zanzara comune ematofaga di Europa (*Culex pipiens* di Meigen) con la zanzara ematofaga dei paesi molto nordici (*Culex pipiens* di Linneo) non sarebbe inopportuno. Ed io espressi questo mio parere, insieme a qualche mio dubbio, in una delle mie note sulle zanzare italiane (1), alla quale rimando, limitandomi qui a dire che anch'io ho dei dubbi che la nostra zanzara comune ematofaga *bionda* sia identica alla nordica. Tutto ciò inteso, fino a nuovi studi chiamerò anch'io *Culex pipiens* la zanzara comune ematofaga europea.

Così il *Culex pipiens*, salve le avvertenze che sopra ho fatto, è una specie accettabile. Se studi ulteriori dimostreranno che la specie nordica (Lapponia) non è identica alla comune zanzara ematofaga europea (*pipiens* di Meigen), allora ad essa specie nordica lasceremo il nome di *pipiens*, L., e alla zanzara comune ematofaga di Europa (e d'Italia) potrebbe darsi il nome di *C. haematophagus* e scrivere *C. pipiens* Meigen, tra i sinonimi.

---

[1] Ficalbi E.—*Quistioni zoologiche intorno al "Culex pipiens"* e descrizione di una specie nuova, *Culex phytophagus.—Boll. d. Soc. ent. ital.* Anno XXI, 1889. Firenze, 1890. Vedi Bibl. N. 187.

ORIGINAL DESCRIPTION OF CULEX VARIOANNULATUS:

Thorax clothed with golden-brown narrow-curved scales, placed with the hairs so as to give a faint linear ornamentation. Abdomen deep brown, the third, fourth and fifth segments with basal pale bands and sometimes the second, and the rest unbanded. Legs unbanded, deep brown, coxae and femora greyish beneath; knee spot white. Wings with typical *Culex* scales.

♀. Head brown, with narrow-curved, creamy scales and brownish-black upright forked scales, small, flat, grey ones at the sides; palpi, proboscis, and clypeus black; antennae brown, almost black.

Thorax deep brown, with dull, golden-brown narrow-curved scales and rows of black bristles; scutellum paler brown, almost grey in one specimen, with eight large border-bristles and several smaller ones; metanotum pale brown; pleurae pale brown and frosty grey.

Abdomen almost black, the fourth, fifth and sixth segments with a creamy basal band, a few basal white scales on the third, remainder unbanded; posterior border-bristles pale; venter almost entirely clothed with creamy scales.

Legs deep brown, unbanded, the coxae and venter of femora pale, ungues small, equal and simple.

Digitized by Google

Wings with the costa, first long vein, third and lower part of the fifth black, other veins brown; first sub-marginal cell longer and narrower than the second posterior, its base considerably nearer the base of the wing, its stem rather less than one-third the length of the cell; stem of the second posterior more than half the length of the cell; posterior cross-vein nearly twice its own length distant from the mid. Halteres testaceous, with slightly fuscous knob.

Length.—4 mm.

Habitat.—St. Michaels, Azores (Dr. Grabham).

Time of capture.—22. 9. 02.

Observations.—Very closely related to *C. Azoriensis*. The abdomen has three or four prominent pale basal bands, and there are no long curved scales in the middle of the occiput. The venation is much as in *C. Azoriensis*. Described from a series taken by Dr. Grabham in the Azores. I am not certain of its male, so have not described it. It is very close to *C. fatigans*, but I feel sure distinct; the last few segments of apex never being banded.

ORIGINAL DESCRIPTION OF CULEX AZORIENSIS:

Thorax brown, with small narrow dull golden-brown scales and two median bare parallel lines in front. Abdomen deep brown above, unbanded, with basal lateral pale spots and pale venter. Legs deep brown, unbanded. Wings with the fork-cells as in *C. pipiens*. Palpi and proboscis deep brown, unbanded. *Head with long narrow-curved golden scales forming a median line.*

♀. Head brown, with curved dull pale golden-brown scales, with a broad line of long paler ones in the middle, with numerous black, thin, upright forked scales and small flat grey ones at the sides; a slightly paler row of scales around the eyes; palpi, proboscis and clypeus black; antennæ deep brown, basal joint and base of the second joint testaceous. Thorax deep brown, with small narrow-curved golden-brown scales and showing two dark bare median parallel lines in front, slightly expanding anteriorly, with black bristles, especially dense over the roots of the wings; scutellum paler brown, with narrow curved pale scales and eight brown bristles to the mid lobe; metanotum pale brown; pleurae pale brown and grey. Abdomen black, unbanded, with golden border-bristles and now and then traces of a few pale scales along the bases of the segments; there are also rather indistinct pale basal lateral spots, the apical segment with many ochraceous scales; venter all pale creamy. Legs deep brown, unbanded, venter of femora creamy-grey; knee spot faint; ungues small, equal and simple. Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the latter; its stem less than one-fourth the length of the cell; stem of the second posterior rather more than half the length of the cell; posterior cross-vein about one and a half times its length distant from the mid cross-vein. Halteres pale, with slightly darker knob.

Length.—4 mm.

♂. Palpi deep brown, with a narrow pale basal band; last two joints and one side of the apex of the antepenultimate joint with black hairs. Thorax, abdomen and legs as in the ♀. Fork-cells of wings moderately long. Ungues of fore and mid legs unequal; the larger uniserrated, the smaller (?).

Length.—4 mm.

Habitat.—St. Michaels, Azores.

Time of capture.—September.

Observations.—Described from a series collected by Dr. Grabham. It comes very near *C. scholasticus*, Theobald, from the West Indies, but the ♂ palpi are hairy and they are not in this species and the median long scales over the head again separate it.

It might also be mistaken for Ficalbi's *C. modestus*, but the abdomen has not scanty yellowish speckling.

ORIGINAL DESCRIPTION OF CULEX OSAKAENSIS (female only):

Thorax with dull golden yellow scales, brighter before the scutellum, with a darker wedge-shaped area on each side in front of the wings and two indistinct darker areas in front of them, the chaetae showing as two dark lines posteriorly on the brighter scaled area; traces of two median parallel bare lines in front; head slightly paler than the thorax. Abdomen deep brown with basal white bands. Legs brown, unbanded. Palpi of ♀ with mottled brown and white scales. . . .

♀. Head deep brown clothed with narrow-curved creamy scales, dark-brown upright forked scales, flat creamy lateral ones few in number and with dark brown chaetae surrounding the front of the head directed towards the middle of the head;

Digitized by Google

palpi clothed with deep brown scales, *white scaled apically;* proboscis deep brown; antennae deep brown, basal segment pale on one side, base of the second segment pale testaceous.

Thorax deep brown, clothed with narrow-curved dull golden scales with two median parallel bare lines and with scantier rather darker scales on each side in front of the wings and another area on each side in front of these showing as darker areas with a hand lens, posterior part of mesonotum paler scaled than the rest, the two median parallel lines of deep brown chaetae showing up prominently; scutellum pale ochreous brown with narrow-curved creamy scales and rich brown border-bristles, eight to the mid lobe; metanotum brown, paler in places; pleurae pale yellowish-brown with patches of flat white scales.

Abdomen deep brown with basal white bands and pale creamy scaled venter; hairs pale.

Legs deep brown, femora and tibiae pale ventrally, hind tibiae with apical pale spot; ungues equal and simple.

Wings with the first fork-cell much longer, but very little narrower than the second posterior cell, its base nearer the base of the wing, its stem not quite one-fifth the length of the cell, stem of the second posterior *not half* the length of the cell; posterior cross-vein nearly twice its own length distant from the mid; lateral vein scales dense. Halteres pale.

Length.—6 mm.

Habitat.—Osaka, Japan.

Observations.—Described from a series sent me some time ago through Mr. Cornford; the name of the collector has been lost.

This species was put on one side as *Culex fatigans*, but its general form seemed different, being larger and of a more straggling build. It differs in having white scaled ♀ palpi, ... and in the wing venation; the short stalk of the first fork-cell is noticeable at once, although variable, and the thorax shows definite but obscure ornamentation. . . .

ORIGINAL DESCRIPTION OF CULEX QUASIGUIARTI (female only):

Head black, a small median paler area in front, eyes silvery; palpi and proboscis black, the former darker. Thorax rich deep brown with bronzy-brown and dull golden narrow-curved scales; pleurae brown and grey with patches of flat white scales. Abdomen of ♀ black unbanded but with lateral basal white spots and golden border-bristles giving almost a banded appearance. . . . Legs unbanded.

♀. Head black with a median V-shaped area of small narrow-curved golden scales, not reaching quite to the nape, dusky at the sides with dense black upright forked scales, which give the head a black appearance, no fork scales on the golden median area; small flat dull white scales at the sides; six black incurved long chaetae on each side on the eye borders; palpi and proboscis jet black; antennae thick, black. Palpi of three segments, the apical one longer than the other two.

Thorax rich deep brown with bright bronzy narrow-curved scales, some showing dull golden reflections especially over the roots of the wings; chaetae black; scutellum pale ochreous with very pale golden scales; metanotum brown; pleurae brown and grey with patches of flat white scales.

Abdomen with dull ochreous integument covered with small flat dark scales with dull violet reflections, black in certain lights, unbanded, but the scales are scanty at the bases of the segments, this and the five brown and golden tipped border-bristles give a quasi-banded appearance; basal segment ochraceous with a squarish median patch of black scales and fine long brown hairs with golden tips; the chaetae in certain lights pale golden; laterally are basal white spots; venter with basal half of segments pale scaled.

Legs uniformly black except base and under side of the femora, a small pale knee spot on each leg; ungues equal and simple.

Wings with rather long fork-cells, the first sub-marginal cell much longer and narrower than the second posterior, its base nearer the base of the wing, its stem about one-fourth the length of the cell; stem of the second fork-cell less than half the length of the cell; posterior cross-vein a little longer than the mid and a little more than its own length distant from it; lateral vein scales long and thin.

Length.—5 to 5.5 mm.

Habitat.—Mpuma, Uganda (Sir David Bruce).

Observations.—Described from three ♀'s . . . . It comes near to *Culex guiarti*, Blanchard, but can be told by the absence of green pleurae, and near *C. Asoriensis*, Theobald, but can be told from that by the peculiar cephalic adornment and the venation . . . . and from *C. chloroventer* in head adornment.

Type in the British Museum.

Digitized by Google

DESCRIPTION OF FEMALE, MALE, LARVA, PUPA, AND EGG OF CULEX PIPIENS:

Female.—Proboscis moderate, uniform, labellæ conically tapered, vestiture brown, pale beneath, darker towards tip; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth the length of proboscis, uniform, clothed with blackish scales, setæ at base long and outstanding. Antennæ moderate, joints subequal, rugose, pilose, blackish, second joint scarcely enlarged; tori subspherical with cup-shaped apical excavation, yellowish shading to dark brown on inner side. Clypeus rounded triangular, convex, brownish black, nude, slightly pruinose. Eyes black. Occiput brown, clothed with narrow, light brown, curved scales, with some broad, flat white ones at lower parts of sides and along margin of eyes, numerous erect, forked scales on vertex, yellowish white or pale brown according to the light.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with a few narrow pale scales and brown bristles. Mesonotum brown with two narrow, impressed, dorsal bare lines in front, clothed with narrow, curved golden-brownish scales and numerous brown bristles. Scutellum trilobate, luteous, clothed with narrow, curved pale-golden scales, each lobe with a tuft of golden-brown bristles. Postnotum elliptical, pale brown, nude. Pleuræ and coxæ brownish luteous, clothed with patches of flat yellowish-white scales and rows of brown bristles.

Abdomen subcylindrical, truncate at tip, clothed with blackish scales dorsally, which have a slight bronzy and bluish reflection, each segment except the first with a basal transverse band of yellowish-white scales, uniform, rather broad, second segment with band produced in middle, widening at the sides to form a row of basal segmentary, triangular, lateral white spots; last segment black, white scaled at sides; venter clothed with yellowish-white scales; membrane beneath dark; hairs at ends of segments long, yellowish.

Wings moderate, hyaline; petiole of second marginal cell about one-fifth or one-sixth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; outstanding scales of vein dark brown, rather broadly linear. Halteres whitish, with brown knobs.

Legs moderate, uniform; femora clothed above with black scales with a bluish and bronzy luster, beneath broadly white to tips, knees and tips of tibiæ whitish; tibiæ and tarsi entirely black scaled with brassy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 4 mm.

Male.—Proboscis long and straight, gradually enlarged towards apex. Palpi exceeding proboscis by more than the length of the last joint, slender, apical portion slightly enlarged; vestiture black with bronzy luster, a narrow pale ring at basal third of long joint; abundant long black hairs at end of long joint and on last two. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black enlarged rings at insertions of hair-whorls; hairs long, black; tori entirely brown. Coloration similar to the female. Abdomen elongate, depressed, dorsally with a slight metallic reflection, basal bands broad, broadened at sides on sixth and seventh segments; eighth segment nearly entirely white scaled; lateral ciliation blackish, abundant. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Genitalia (plate 17, fig. 123; plate 19, figs. 138 and 139): Side-pieces over twice as long as wide, tips rounded with a low rounded subapical prominence bearing a spine, four rods with bent tips, a leaf-like appendage and a seta; clasp-filament moderate, stout with a terminal articulated spine. Harpes divided, inner branch bearing a large tuft of spines at tip, outer short and curved; harpagones divided, branches subequal. Unci obscured.

Digitized by Google

Larva, Stage IV (plate 99, fig. 328).—Head large, subquadrate, broader than long, sides bulging, a notch at insertion of antennæ, front margin arcuate. Antennæ rather large, basal two-thirds thickened, spinose, apical third slender, a large tuft at set-off; two long setæ before tip, a long terminal seta, a short one and a small digit on a pedestal. Both pairs of dorsal tufts and ante-antennal tufts multiple. Mental plate with straight sides and triangular apex, a large central tooth and eleven on each side, first three small and densely crowded, last one also small. Mandible quadrangular, two filaments before tip with four short hairs arising from their base; an outer row of cilia from a collar; a row of transverse prominences on outer margin bearing hair-tufts; dentition of three rather widely separated teeth on a process, first longest; a long tooth before, three at base, a filament within; process below undivided, with a few hairs; angle below sharp; a group of hairs within and a row at base. Maxilla conical, divided by a suture; inner half hairy on margin and in a band near suture; a tuft of long hairs at tip running along the suture; outer half with two filaments about middle preceded by a few hairs, a spine on other side. Palpus moderate, terminal digits rather long. Thorax rounded, wider than long; hairs abundant, moderate, anterior thoracic hairs about as long as head. Anterior abdominal segments short, posterior ones elongated; lateral tufts of first two segments multiple, two hairs on third to sixth; subdorsal hairs double on third to sixth segments. Tracheal tubes narrow, irregularly flexuous posteriorly. Air-tube elongate, slightly fusiform, five times as long as wide; pecten teeth on basal third; single tooth short, with four long basal branches; several hair-tufts beyond pecten the subapical one out of line. Lateral comb of eighth segment of numerous scales in a triangular patch, single scale with feathered tip. Anal segment longer than broad, ringed by the plate; dorsal hairs unequal, three on a side; a single lateral hair; ventral brush well developed, confined to the barred area. Anal gills longer than the segment, rather broad, tips bluntly pointed.

Pupa (plate 148, fig. 701).—Thoracic mass subpyriform, stout; small hair-tufts on thorax anteriorly; air-tubes moderate, slightly expanded, notched at tip. Abdomen stout, with numerous hair-tufts, eighth segment with small multiple hair-tufts on apical angles. Anal paddles elongate-ovate, with simple, minute terminal seta.

The eggs (plate 147, fig. 686) are laid arranged upright in boat-shaped masses. They are subcylindrical and taper slightly to the upper end; micropylar end broadly rounded. The number of eggs in a mass, according to counts of ten masses by Davis, ranges from 120 to 309.

The species occurs associated with man and is abundant in our northern cities, breeding in various receptacles containing water. In America it is usually rare or absent in the rural districts, being largely replaced by *Culex restuans*. The females bite at night, but with the approach of cold weather cease to bite and seek places for hibernation. The species appears to be less troublesome to man than *Culex quinquefasciatus*. The males have been found feeding on the honey of flowers and do not hibernate. Schmitz reports that in Holland the adults occur in caves throughout the year. Mr. Knab has observed the mating habits of this species, and we have quoted his account in the first volume of this work, page 121.

Professor Smith has recorded numerous observations under the specific name *Culex pipiens*, but without seeing his specimens we are unable to tell to what species they actually refer; probably to a mixture of *Culex pipiens*, *Culex salinarius*, and *Culex restuans*. These three species breed indiscriminately in rain-barrels, and are collectively known as "the house mosquito."

Digitized by Google

The species breeds continuously in warm weather and in consequence increases in numbers as the season advances. Knab, in Massachusetts, found that the larvæ began to appear in May. Eggs, larvæ and pupæ are destroyed by the first frosts. The larvæ most frequently occur in artificial receptacles, but also in ground pools when these are sufficiently polluted. In cities they breed extensively in the catch-basins of sewers. Here, when there is a long period without rain and the sewers are not flushed, they increase enormously. Six days is given as the minimum larval period, but frequently it is much longer and it may be greatly prolonged by unfavorable food and temperature conditions. The presence of organic matter favors the development of this species and it is able to thrive in highly polluted water. In a case observed by Knab, and already quoted under the mating habits, the water was highly charged with the refuse from slaughtered animals; here the larvæ were so numerous that the ends of their breathing-tubes at the water-surface gave the appearance of a scum; egg-rafts were present over an extensive surface to the number of about 20 to the square foot. Larvæ, pupæ and eggs were still present early in November. Ficalbi, for Italy, states that the larvæ sometimes occur in swamps as well as in ditches, but that they occur most frequently in artificial receptacles in and out of doors. He has found them in the fonts of consecrated water in churches. He has also found them in sulphurous water. At Murphysboro, Illinois, Mr. C. A. Mosier found the larvæ in a large hall, in December; they were in basins with water into which tubs with palms were set.

Temperate regions of the northern hemisphere, but not in the extreme north; in North America, the northern Atlantic coast region, westward through Illinois; Europe and probably temperate Asia.

Virginia Beach, Virginia, September 20, 1911 (H. G. Dyar); Arlington, Virginia (T. Pergande); Washington, District of Columbia, October 20 (H. G. Dyar); Williamsport, Port Jervis, Johnstown, Pittsburg, Springdale, Norristown, Pottsville, Devon, Altoona, York, Harrisburg, Ardmore, and Sunbury, Pennsylvania (H. L. Viereck); Bellport, New York (H. G. Dyar); Ithaca, New York (O. A. Johannsen); Fairfield, Connecticut, August and September, 1910 (V. Havard); West Springfield, Massachusetts (F. Knab); Durham, New Hampshire (H. G. Dyar); Chicago, Illinois (E. O. G. Kelley); Murphysboro, Illinois (C. A. Mosier); Urbana, Illinois (F. Knab); Copenhagen, Denmark (F. Meinert); St. Rémy la Varenne, Maine et Loire, France (R. du Buysson); Buda-Pesth, Hungary (C. Kertész); Màlaga, Spain, December, 1908 (C. Visich). Also reported from the Azores, Japan and generally distributed through temperate and southern Europe and northern Africa; also south eastern Africa. Probably also widely distributed through temperate Asia.

We consider *Culex pipiens* to be a species introduced into North America from Europe. Its comparatively restricted distribution in this country indicates this. We have convinced ourselves that our species is identical with the European by study of male genitalia of European and North American specimens.

Meigen appears to have been the first to restrict the name to the common house-mosquito of central Europe. On the other hand Zetterstedt (Insecta lapponica, 807, 1840) applied the name to forms which we now refer to the genus *Aëdes*. This necessitates the elimination of a number of the references under *Culex pipiens*. As a result of the division of opinion in the restriction of *Culex pipiens*, Ficalbi proposed the name *Culex hæmatophagus* for the present species (Bull. Soc. ent. Ital., xxv, 143, 1893). A considerable synonymy obtains in the European literature, but on examination we have almost completely discarded it. Blanchard includes in the synonymy *Culex ciliaris* Linnæus, *Culex*

Digitized by Google

vulgaris Linnæus, *Culex alpinus* Linnæus, *Culex communis* de Geer, *Culex domesticus* Germar, *Culex rufus* Meigen, and *Culex agilis* Bigot. But as some of these forms are apparently distinguished by sufficient characters, and in others the identity does not seem well established, we have omitted the names. *Culex vulgaris* and *C. alpinus* were names used by Linnæus before 1758, the beginning of accepted zoölogical nomenclature, and therefore they have no standing. In their resurrection, in the second edition of the Flora Lapponica, we take the first to be a *Simulium*, the second an *Aëdes*. *Culex communis* de Geer is apparently referred here because de Geer himself cites *pipiens* Linnæus, twelfth edition of the Systema Naturæ, under his bibliography of *communis;* but an inspection of his figures of the larva (Mém. des Insectes, vi, pl. 17, especially figs. 2 and 5, 1776) shows that he was describing some species of *Aëdes*. *Culex domesticus* has been already discussed under *C. quinquefasciatus*. Ficalbi described as distinct a form which he found abundant in Italy, breeding in the same situations and closely resembling *Culex pipiens*, but which did not suck blood. He found females which showed a green color from the chlorophyl of the plant juices they had imbibed and therefore he called the species *Culex phytophagus* (Bull. Soc. ent. Ital., xxi, 126, 1890). He also found that these specimens could be distinguished by their darker color. But later Grassi suggested to Ficalbi that the two forms might be one species, and Ficalbi, reconsidering the matter, reached this conclusion (Bull. Soc. ent. Ital., xxxi, 210, 1899). He found that fresh females of *Culex pipiens* do not bite readily and he thought that their color became lighter with age. This last opinion is not borne out by our experience, nor have we ever met or found recorded females of *Culex pipiens* of a greenish color from imbibed chlorophyl-containing liquid. We must therefore discard this synonymy until the question is studied in an exact way with authentic material, by comparison of larvæ and male genitalia.

It is also probable that what Rondani, Ficalbi and Grassi called *Culex pipiens* was in part or wholly *Culex quinquefasciatus*. The only names that remain for us to quote in the synonymy are *C. hæmatophagus* Ficalbi (a substitute name for *C. pipiens*), and *C. consobrinus* Robineau-Desvoidy. We concur in the view of Giles and Aldrich that *Culex consobrinus* is a synonym of *C. pipiens*. References to its wrong use for another species will be found in our synonymy of *Culiseta inornatus*. There are, no doubt, in Europe many species of *Culex* and *Aëdes*, comparable with the North American forms, that have been confused and associated under too few names by European authors. Until the European mosquitoes are studied by modern methods and the types of the old species examined from the new view-point no comprehensive synonymy can be accepted. Ficalbi in his description of the form for which he proposed the name *Culex hæmatophagus* states that the pale dorsal bands are laterally produced on some of the abdominal segments and on this account we supposed the form to be distinct. We find, however, that both sexes are described together and that this character was probably taken from the male. There exists a considerable literature in American publications under the name *Culex pipiens*, but we have been obliged to pass it over almost unmentioned, as it certainly does not refer to this species alone, and we have no certainty that the true *Culex pipiens* was even a component part of the material discussed. It is at least certain that the records from far northern localities do not apply to this species, but to species of *Aëdes* with unbanded legs. Specimens from the warmer parts of America, which have been called *Culex pipiens*, belong to other species, mostly, if not wholly, to *C. quinquefasciatus*. In the old world many of the records from warmer latitudes undoubtedly are referable to the last-mentioned species. The southward dis-

Digitized by Google

tribution of *Culex pipiens* in the Eastern Hemisphere yet remains to be determined. We have added to the synonymy the names *Culex varioannulatus, C. azoriensis, C. osakaensis,* and *C. quasiguiarti,* all of Theobald, on the authority of F. W. Edwards, who has examined the types in the British Museum (Bull. Ent. Res., iv, 55, 1913).

CULEX COMITATUS Dyar & Knab.

Culex cubensis Dyar (in part), Proc. U. S. Nat. Mus., xxxii, 124, 1907.
Culex comitatus Dyar & Knab, Proc. Ent. Soc. Wash., xi, 35, 1909.

ORIGINAL DESCRIPTION OF CULEX COMITATUS:

The genitalia have the general characters of *quinquefasciatus*, race *dipseticus*, but differ especially in the character of the second plate of the harpagones, which is no longer a plate, but a tubular structure, with oblique open tip. The first plate of the harpagones is broad and rather long, with rounded tip, essentially as in *dipseticus*. The basal projection of the harpes is very short, but this cannot be especially emphasized, as its apparent condition varies greatly with the position of the mount.

Our specimens are from National City, San Diego, Sweetwater Junction, Laguna, Avalon, Los Angeles, San Pedro, San Luis Obispo, and Stanford University, California, all these places being on the coast, south of San Francisco, or on the adjacent islands.

It is somewhat curious that the species *Culex quinquefasciatus*, after ranging throughout the warmer parts of the world unchanged, should, in the arid parts of America, develop first a distinct race and finally a species. This must be of significance in regard to the original home of the species. Evidently *quinquefasciatus* is of tropical American origin, and has latterly spread, no doubt through the agency of commerce, to all the warmer regions of the world. In these places it has not been resident long enough to develop local races and species, as it has done in America. Conversely, it is probable that *Culex pipiens* is of European origin, and has only latterly spread to America through the agency of commerce.

Culex comitatus has the same habits as its congener, *quinquefasciatus*. The larvæ occur in all sorts of artificial accumulations of water, and the adults frequent houses and attack the inmates at night.

Type.—No. 12201, U. S. Nat. Mus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX COMITATUS:

Female.—Proboscis moderate, uniform, labellæ conically tapered; vestiture blackish brown with a bronzy luster, paler beneath, darker towards tip; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth the length of proboscis, uniform, clothed with blackish scales, setæ at base long and outstanding. Antennæ moderate, joints subequal, rugose, pilose, blackish, second joint scarcely enlarged; tori subspherical with a cup-shaped apical excavation, yellowish shading to brown on inner side. Clypeus rounded triangular, convex, brown, nude. Eyes black. Occiput brown, clothed with narrow, curved scales, whitish with a slight brownish tinge, with some broad, flat white ones at lower part of sides and along margins of eyes; numerous erect, forked scales above, yellowish white or dark brown, according to the light.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with a few narrow pale scales and brown bristles. Mesonotum brown with two narrow, impressed, dorsal bare lines in front, clothed with narrow, curved golden-brownish scales and numerous brown bristles. Scutellum trilobate, brown, clothed with narrow, curved pale-golden scales, each lobe with a tuft of golden-brown bristles. Postnotum elliptical, pale brown, nude. Pleuræ and coxæ brownish luteous, clothed with patches of flat yellowish-white scales and rows of brown bristles.

Abdomen subcylindrical, truncate at tip, depressed, clothed dorsally with blackish scales which have a slight bronzy and bluish reflection, the segments with a basal transverse band of yellowish-white scales, broad and produced in middle, much narrowed at sides, but joined to a row of triangular lateral basal segmental spots; first segment with a patch of dark scales and many pale hairs; last segment white scaled with a small black spot in middle; venter clothed with

Digitized by Google

yellowish-white scales, membrane beneath dark; hairs at ends of segments long, yellowish.

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; outstanding scales of veins dark brown, linear, denser towards apex of wing. Halteres whitish with brown knobs.

Legs moderate, uniform; femora clothed above with black scales with a bluish and bronzy luster, beneath broadly white to tips, knees and tips of tibiæ narrowly whitish; tibiæ bronzy-black scaled, front and mid ones pale beneath throughout, hind ones pale nearly to tip; tarsi bronzy black, somewhat paler beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 4 mm.

Male.—Proboscis long and straight, gradually enlarged towards apex. Palpi exceeding the proboscis by more than the length of the last joint, slender; end of long joint and last two joints somewhat thickened and clothed with many long black hairs; vestiture black, a narrow white ring at basal third of long joint, last two joints white scaled beneath. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black enlarged rings at insertions of hair-whorls; hairs long, black; tori brown. Coloration similar to the female. Abdomen elongate, broadened and depressed apically; pale bands on dorsum broad, occupying nearly basal halves of segments, expanded laterally to tip on seventh segment; lateral ciliation blackish, abundant. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 3.3 mm.

Genitalia (plate 18, fig. 131): Side-pieces over twice as long as wide, tips rounded, with low, rounded subapical prominence bearing a spine, four rods with bent tips, a leaf-like appendage and a seta; clasp-filament moderate, stout, with terminal articulated spine. Harpes divided, inner branch bearing large tuft of spines at tip, outer rudimentary; harpagones divided, the four branches subequal, subterminal one rounded and tubular. Unci obscured.

Larva, Stage IV (plate 99, fig. 326).—Head rounded, somewhat wider than long, bulging in region of eyes; antennæ long, rather stout, a tuft at outer third, part beyond it slender; upper pair of head-hairs in fives, lower in fours, anteantennal tuft multiple. Body with skin glabrous; lateral abdominal hairs in twos after second segment, subdorsal hairs in twos; lateral comb of eighth segment of many spines in a triangular patch. Air-tube four times as long as wide, subfusiform, tapering towards tip; pecten of about ten teeth on basal third of tube; four tufts beyond it, subapical one moved laterally out of line, the two basal tufts six-haired, the subapical one two-haired; terminal hooks minute. Anal segment longer than wide, ringed by the plate; dorsal tuft of four hairs of different lengths on each side; lateral hair single, small; ventral brush confined by the chitinous ring. Anal gills about as long as segment, pointed at tip, equal.

The larvæ occur in ground-pools, but are most frequently found in artificial receptacles. Dr. Dyar found them commonly in the cellar of a house, associated with *Culiseta incidens*, and also obtained them in a water-barrel; Mr. Caudell found them in an old tin can.

Coast region of southern California.

National City, June 2, 1906 (Dyar & Caudell); San Diego, June 2, 1906 (Dyar & Caudell); Sweetwater Junction, June 2, 1906 (Dyar & Caudell); Laguna, June 14, 1906 (H. G. Dyar); Avalon, June 14, 1906 (A. N. Caudell);

Digitized by Google

Los Angeles, June, 1906 (H. G. Dyar); San Pedro, July 10, 1901 (T. D. A. Cockrell); San Luis Obispo, June 27, 1906 (A. N. Caudell); Stanford University, June 28, 1903 (I. McCracken).

So far as we know, this species is confined to the coast of California. It does not occur in the interior, specimens collected at Indio and Coachella, California, being *Culex quinquefasciatus*. It is allied to that species, yet approaches the European *Culex pipiens* in coloration.

CULEX FACTOR Dyar & Knab.

Culex factor Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 206, 212, 1906.
Culex factor Dyar & Knab, Proc. Ent. Soc. Wash., xi, 37, 1909.

ORIGINAL DESCRIPTION OF CULEX FACTOR:

Antennal tuft beyond the middle, the member pale on the basal half. Head hairs in threes; body pilose; tracheal tubes broader than in *coronator*. Lateral hairs in twos after the second abdominal segment. Subdorsal hairs very long and in twos on segments 4 to 7. Air tube long, 6 × 1, the pecten reaching to one-third.

Collected by the junior author at Santa Lucrecia, Rincon Antonio, Tehuantepec and Salina Cruz, Mexico, and labeled "*Culex* ? *secutor* Theob." by Mr. Coquillett. Others were taken at St. Vincent, Barbadoes and Martinique by Mr. Busck and labelled "*Culex salinarius* Coq." by the author of that species; but these specimens of Mr. Busck we refer here more doubtfully, as their condition is so poor that we cannot be certain of them. Mr. Busck's material was all taken out and handled by Mr. Coquillett before our final examination, which extra handling was far from beneficial to the skins.

The following is an abstract of the table:

1.	Antennæ with tuft outwardly placed, part beyond slender	5
5.	Air-tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four paired tufts posteriorly outwardly (sometimes increased by additional ones basally), the subapical one moved laterad out of line, usually situated at the outer third of the tube	14
14.	Air tube long, over 5 × 1, the sides nearly straight without marked tapering	15
15.	Body spicular-pilose	16
16.	Air tube 6 × 1, tufts 2-haired and long; antennæ pale at base	*factor*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX FACTOR:

Female.—Proboscis moderate, rather stout, slightly expanded at tip, labellæ conically tapered; vestiture brown, with a whitish broad shade in middle beneath, darker towards tip; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth the length of proboscis, uniform, clothed with blackish scales, setæ at base long and outstanding. Antennæ moderate, joints subequal, rugose, pilose, blackish, second joint scarcely enlarged; tori subspherical with a cup-shaped apical excavation, yellowish shading to dark brown on inner side. Clypeus rounded triangular, convex, brownish black, nude, slightly pruinose. Eyes black. Occiput pale brown, clothed with narrow, curved scales, flat ones on lower part of sides, yellowish white on vertex, white along margins of eyes and lower part of sides, numerous erect, forked black scales on vertex densest at sides.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with a few narrow pale scales and brown bristles. Mesonotum brown with two narrow, impressed, dorsal bare lines, clothed with narrow, curved pale-bronzy scales, paler around ante-scutellar space, and numerous brown bristles. Scutellum trilobate, luteous, clothed with narrow pale scales, each lobe with a tuft of brown bristles. Postnotoum elliptical, yellowish brown, nude. Pleuræ and coxæ greenish luteous, clothed with patches of flat white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip, clothed dorsally with blackish scales, which have a bronzy-bluish metallic reflection, each segment but

Digitized by Google

the first with a narrow transverse band of white scales, the one on second segment represented by a small pointed patch; bands widened on sides; last segment entirely white scaled; venter clothed with yellowish-white scales; membrane beneath dark; hairs at ends of segments pale and long, the tip bristly.

Wings moderate, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins dark brown, linear, those on forks of second and fourth vein broader and denser. Halteres whitish, with brown knobs.

Legs moderate, uniform; femora and tibiæ clothed above with black scales with a bluish and bronzy luster; femora beneath broadly white to tips except hind pair, hind tibiæ whitish within; front and middle tibiæ and tarsi with a brassy shade on under side; knees and tips of tibiæ whitish. Claw formula, 0.0–0.0.0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis gradually but distinctly swollen towards apex, bronzy black; above with a pale shade at middle, more distinct below. Palpi exceeding proboscis by more than the length of the last joint, slender, uniform, apical portion somewhat enlarged; vestiture black, with paler scales on long joint and with a line of pale scales on under surface, rather long black hairs at end of long joint and on last two. Antennæ rather long, plumose; last two joints long and slender, rugose, pilose, black, the others short, but rather longer than usual, whitish, with black enlarged rings at insertion of hair-whorls; hairs long, black; tori entirely brown. Coloration similar to the female. Abdomen long, depressed, nearly parallel-sided; basal bands broad, those on sixth and seventh segments expanded at the sides, eighth segment mostly black scaled; lateral ciliation moderate, rather irregular, pale brown. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.2 mm.; wing 2.8 mm.

Genitalia (plate 15, fig. 105): Side-pieces over twice as long as wide, tips rounded with quadrate apical projection bearing three curved rods with hooked tips, leaf-like appendage and a setæ; clasp-filament moderate, slightly inflated centrally with a terminal articulated spine. Harpes divided, the inner branch bearing a large tuft of spines at tip, the outer long and curved; harpagones divided, one branch forming a slender curved spatulate process reaching to spinose tips of harpes. Unci obscured. Basal appendages, short, remote, setose.

Larva, Stage IV (plate 100, fig. 329).—Head rounded, widest through eyes, bulging on sides, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, slightly curved, thick on basal two-thirds, well spinulated, with a large hair-tuft from a notch; two long setæ before tip, a long seta, a short one and a digit at tip. Dorsal head-hairs in threes, the ante-antennal tufts multiple. Mental plate triangular, straight on sides; a prominent medium tooth and nine on each side, penultimate one large and slightly projecting. Mandible quadrangular; two filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of transverse rounded prominences on outer margin bearing hair-tufts; dentition of four teeth on a process, first much the longest; a spine before, a small tooth and a large trifid one at base, a long serrate filament and a row of feathered hairs within; process below elongate, with two angular prominences on outer edge bearing rows of hairs, tip obscurely furcate; basal angle small, a row of hairs within with slightly enlarged bases; a row of long basal hairs. Maxilla elongate with conical tip, divided by a suture; inner half with a row of stout spines on margin, some of basal ones feathered, two rows of cilia within; a row of long hairs at tip running down along suture; outer half with

Digitized by Google

two filaments below middle and a spine on other side. Palpus small, tapered, with four rather long irregular apical digits. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter; lateral hairs in fours on first abdominal segment, in threes on second, in twos on third to sixth; subdorsal hairs very long, in twos or threes on fourth to seventh segments; tracheal tubes rather broad; skin pilose. Air-tube long, slightly tapered, six times as long as wide; pecten reaching about one-third; single teeth broad with four to six branches; four two-haired tufts on posterior margin beyond pecten, the one before the last moved laterally out of line. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at tip, with an apical fringe of spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft a group of long and short hairs on each side; a single lateral hair; ventral brush well developed, confined to the barred area. Anal gills moderately long, slightly longer than the segment, with ensiform tips.

The larvæ live in ground-pools. Mr. Knab got them in small puddles, in foot-prints in a muddy roadway, in a shallow puddle of discolored water, and in some pools near a beach; Mr. Jennings got them in a swamp near the sea.

Southern Mexico and Central America.

Tehuantepec, Mexico, July 3, 1905 (F. Knab); Santa Lucrecia, Mexico, June 19, 1905 (F. Knab); Salina Cruz, Mexico, July 9, 1905 (F. Knab); La Boca, Canal Zone, Panama, November 19, 1907 (A. H. Jennings).

Our typical specimens came from southern Mexico, and we later obtained others from Panama. In our first description, we included specimens from St. Vincent, Barbados, and Martinque, with some doubt, as the larval skins had been injured. We now separate the specimens from Barbados under the name *Culex caraibeus,* and have referred the St. Vincent specimens to *Culex similis;* the Martinique specimens appear to be another species, but, as we have male adults only and the larval skins are damaged, we have been obliged to leave the species undetermined, although excluded from *Culex factor.* The specimen recorded by Mr. Busck (Smiths. Misc. Colls., quart. iss., lii, 70, 1908) proves to be really a specimen of *Culex revelator,* with abnormal markings, and will be found discussed under that specific heading.

CULEX SALINARIUS Coquillett.

Culex nigritulus Smith (not Zetterstedt), Ent. News, xiii, 303, 1902.
Culex nigritulus Dyar (not Zetterstedt), Journ. N. Y. Ent. Soc., xi, 24, 1903.
Culex nigritulus Dyar (not Zetterstedt), Proc. Ent. Soc. Wash., v, 143, foot-note, pl. ii, fig. 6, 1903.
Culex nigritulus Johannsen (not Zetterstedt), Bull. 68, N. Y. State Mus., 416, 1903.
Culex nigritulus Smith (not Zetterstedt), Rept. N. J. Agr. Exp. Stat. for 1902, 535, 1903.
Culex salinarius Coquillett, Ent. News, xv, 73, 1904.
Culex salinarius Smith, Bull. 171, N. J. Agr. Exp. Sta., 23, 1904.
Culex salinarius Dyar, Journ. N. Y. Ent. Soc., xii, 173, 1904.
Culex salinarius Felt, Bull. 79, N. Y. State Mus., 332, 1904.
Culex salinarius Blanchard, Les Moustiques, 630, 1905.
Culex salinarius Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 316, 1905.
Culex salinarius Felt, Bull. 97, N. Y. State Mus., 445, 1905.
Culex salinarius Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 212, 1906.
Culex salinarius Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 23, 1906.
Culex salinarius Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Culex salinarius Smith, Rept. Ent. Dept. N. J. Agr. Exp. Sta., 1905, 685, 1906.
Deinocerites cancer Mitchell (not Theobald), Psyche, xiii, 20, fig. 3, 1906.
Culex salinarius Smith, Can. Ent., xxxix, 119, 1907.
Culex salinarius Theobald, Mon. Culicid., iv, 421, 1907.
Culex salinarius Weber, Mutation in Mosq., Weber's Archives, i, No. 2, 1907.
Culex salinarius Dyar & Knab, Proc. Ent. Soc. Wash., xi, 36, 1909.
Culex salinarius Theobald, Mon. Culic., v, 386, 1910.
Culex salinarius Morse, Ann. Rept. N. J. State Mus., 1909, 720, 1910.

Digitized by Google

Original Description of Culex salinarius:

In the autumn of 1902 specimens of a small *Culex* were received from Prof. J. B. Smith, with the statement that they were bred from larvæ living in the salt marshes of New Jersey; they agreed so well with the published descriptions of *Culex nigritulus* Zetterstedt that they were referred to that species. The recent appearance of the third volume of Theobald's Monograph of the Culicidæ, however, has thrown a grave doubt upon the correctness of this reference, since the figure which he gives of the male clasper on page 201 is very different from the same organ in our species. In the second volume of the Monograph, upon which the identification of our species was chiefly based, no mention was made of the male claspers, but in the remarks on this species near the bottom of page 141 occurs this statement: "I can detect no difference in the ♂ ungues or any important structural detail from *C. pipiens*," thus implying that the claspers are like those of the latter species, figured on page 134.

Prof. Smith assures me that repeated searching by himself and his assistants has failed to discover larvæ of our species in fresh water, it being essentially a salt-water species. Mr. Theobald tells us that the specimens of *nigritulus* treated of in the second volume of his Monograph were collected by himself "in great numbers in and over half-filled water-butts"—presumably of fresh water. The specimens upon which Zetterstedt founded his original description were from Quickjock, in the northwestern part of Sweden, within the Arctic Circle and over one hundred miles from salt water.

Thus all the facts indicate that *nigritulus* is a fresh-water species distinct from our salt-water form; the latter will, therefore, require a new name, for which *Culex salinarius* is proposed. The male is so similar to *pipiens* that, as yet, I am unable to point out any distinguishing characters; the first joint of the claspers bears beyond the middle of the inner side an irregular row of about five chiefly flattened spines, while near the outer end of this row is an elongate-oval lamella. The female is also remarkably like *pipiens*, but the cross-bands of yellowish scales on the abdomen are narrower, being scarcely apparent on the anterior segments.

The larva has been well figured by Dr. H. G. Dyar (Jour. N. Y. Ent. Soc., XI, Plate II, Figure 3); strangely enough, it has not a rounded head and robust subanal tube, as in *pipiens*, but a subquadrate head and long, slender subanal tube, as in *territans*, from which it can scarcely be distinguished except that the spinous processes on the subanal tube have three or four branches, while in *territans* they usually have a single branch.

Description of Female, Male, and Larva of Culex salinarius:

Female.—Proboscis rather slender, uniform, labellæ conically tapered; vestiture black with a pale sheen on under side; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, nearly one-fifth the length of proboscis, uniform, clothed with blackish scales, setæ at base long and outstanding. Antennæ moderate, joints subequal, rugose, pilose, blackish, second joint scarcely enlarged; tori subspherical, with a cup-shaped apical excavation, yellowish shading to dark brown on inner side. Clypeus rounded triangular, convex, brownish black, nude, slightly pruinose. Eyes black. Occiput brown, clothed with narrow, curved golden-brown scales on the vertex, with small, flat white ones on lower part of sides and margin of eyes; numerous erect, forked black scales in a dense mass at sides, appearing like a large black subdorsal spot, fewer on rest of surface.

Prothoracic lobes elliptical, remote dorsally, luteous, clothed with a few narrow pale scales and brown bristles. Mesonotum brown, with two narrow dorsal bare lines, clothed with rather sparse, minute hair-like coppery brown scales and numerous long brown bristles. Scutellum trilobate, luteous, clothed with hair-like golden scales, each lobe with a group of black bristles. Postnotum elliptical, luteous, nude. Pleuræ and coxæ pale luteous, clothed with patches of flat white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip, clothed with blackish scales dorsally, which have a slight bluish reflection, each segment except the first with a very narrow basal transverse band of dull yellowish-white scales, the proximal ones obsolete or entirely absent; a row of diffused lateral white spots; last segment dark scaled dorsally; venter clothed with yellowish-white scales,

Digitized by Google

membrane beneath dark, a faint transverse dusky band before tip of each segment; hairs at tips of segments coarse, abundant, pale.

Wings moderate, hyaline; petiole of second marginal cell about one-fourth or one-fifth as long as its cell, that of the second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins bronzy, bluish black on costa, rather broadly linear, denser on forks of second vein. Halteres whitish with brown knobs.

Legs moderate, uniform; femora clothed above with black scales with a bluish and bronzy luster, beneath broadly white to tips, knees whitish; tibiæ and tarsi entirely bronzy-black scaled with strong brassy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 4 mm.

Male.—Proboscis straight, gradually enlarged towards apex, vestiture black above, paler beneath with a whitish shade at middle. Palpi exceeding proboscis by more than the length of the last joint, slender, apical part slightly enlarged; vestiture black, a pale ring on long joint before middle, last two joints with broken line of whitish scales beneath; abundant long black hairs at end of long joint and on last two. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black enlarged rings at insertions of hair-whorls; hairs long, black; tori entirely brown. Coloration similar to the female. Abdomen elongate, depressed, dorsally with basal bands broader than in the female, those on sixth and seventh segments expanded at the sides to posterior angles; lateral ciliation pale and abundant. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Claw formula, 1.1–1.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 17, figs. 121 and 122): Side-pieces over twice as long as wide, tips rounded with a quadrate apical projection bearing three curved rods with hooked tips, a leaf-like appendage and two setæ; clasp-filament moderate, slender with a terminal articulated spine. Harpes divided, inner branch bearing a large tuft of spines at tip, outer long and recurved; harpagones divided into a number of teeth. Unci obscured. Basal appendages, short, remote, setose.

Larva, Stage IV (see figure of the entire larva, plate 55).—Head large, subquadrate, wider than long, front margin feebly arcuate. Eyes slightly bulging, transverse, bluntly pointed. Antennæ elevated on a triangular insertion, long, curved, terminal third narrow, a small process bearing a very large tuft of feathered hairs, below which the thick basal part is densely spined and pale colored; two long subapical setæ, a long seta, a short one and a small digit at tip. Both pairs of dorsal head-tufts and ante-antennal tufts multiple, long. Mental plate quadrate, triangular at tip, a stout central tooth followed by five small teeth on each side and three larger ones below, the first of these projecting above the small lateral teeth. Mandible quadrangular, nearly square; two long filaments towards tip, with four slender ones arising from the same point; a row of cilia outwardly from a collar; a row of spinose processes within outer margin; dentition of four teeth on a process, the first very large and somewhat spear-shaped; a long tooth before, three small irregular teeth at base, a double filament and row of fine feathered hairs within; process simple, bent, with tuft of hair at tip and a slight one near base; angle below prominent; a row of hairs within; a row of a few long hairs at base. Maxilla sharply conical, divided by a narrow suture; inner half with irregular patches of hair and a large group of spines; a row of long hairs at tip running along the suture; outer half with filaments near suture small and basally placed, preceded by a few hairs; spine on other side subapical. Palpus very small, with four rather long irregular

Digitized by Google

apical digits. Thorax subquadrate, rounded, wider than long; hairs abundant, very long, some of the laterals of the meso- and meta-thorax of brush-like tufts. Abdomen slender, anterior segments short and transverse, posterior ones progressively more elongate; hairs moderate, lateral tufts of anterior segments multiple, those of third to sixth double; subdorsal hairs in fours and threes on third to sixth segments. Tracheal tubes narrow, linear, flexuous. Air-tube slender, long, about seven times as long as basal width, uniformly and very slightly tapered, without any apical expansion; pecten small, reaching about one-third of length of tube, followed by four small tufts along posterior line, the subapical one out of line; single pecten tooth a moderate spine with wide base and three long branches. Lateral comb of eighth segment of numerous scales in a patch, single scale roundedly triangular, widest outwardly, the broad tip fringed with about seven equal spines. Anal segment a little longer than wide, ringed by the plate; dorsal tuft of two long and two short hairs on each side; a small double hair on lateral margin; ventral brush well developed, limited by the plate. Anal gills small, tapered, not as long as anal segment.

The eggs (plate 147, fig. 687) are laid in boat-shaped masses. The larvæ live in ground-pools and artificial receptacles. They are often very abundant in fresh-water marshes close to the sea-coast, which has led to the misleading specific name, *salinarius*. The species is really not addicted to salt water, in fact it never occurs in it, but in fresh-water pools, often far from the coast. The larvæ occur in rain-barrels and other artificial receptacles, mixed with *Culex pipiens, Culex quinquefasciatus* and *Culex restuans*. The females hibernate. The life history, as far as known, seems to be very similar to that of *Culex pipiens*. Dr. Dyar found the larvæ in a fresh-water marsh back of a beach; Mr. Caudell found them in a ditch; Mr. Brehme in marshes; Mr. Knab in a pool in a stream-bed and in rain-barrels; Mr. Busck in rain-barrels and Mr. Weber found them in various pools and ditches.

United States, east of the Great Plains, apparently not extending into Canada.

West Springfield, Massachusetts, August, 1903 (F. Knab); Elizabeth, New Jersey, July 30 (H. H. Brehme); Altoona, Pennsylvania, associated with *Culex pipiens* (H. L. Viereck); York, Pennsylvania (H. L. Viereck); Chesapeake Beach, Maryland, June 17 (H. G. Dyar); Georgetown, District of Columbia (A. N. Caudell); St. Louis, Missouri, September, 1904 (A. Busck); Corbin, Kentucky, August 24, 1904 (H. S. Barber); Cairo, Illinois, July 25, 1904 (H. S. Barber); Urbana, Illinois, September, 1904 (F. Knab); Ames, Iowa, August 14, 1906 (H. J. Quayle); Baton Rouge, Louisiana (H. A. Morgan). The species is also recorded from other localities in the same region.

Culex salinarius was first found in the vicinity of salt-marshes, and was wrongly supposed to be an inhabitant of salt water. It was named in allusion to this supposition. It is more commonly found in the vicinity of salt-marshes, though not in the water containing salt, at least normally or to any extent. The banding of the abdomen of the adult varies, being either present or absent, and we have consequently placed the species twice in our table. For remarks on Mr. Weber's opinion of the mutability of this species, see our discussion under *Culex restuans* (p. 337). This species was at first identified as the species called *Culex nigritulus* by Theobald, but which is not the *nigritulus* of Zetterstedt. Theobald's *nigritulus* is considered by F. W. Edwards a varietal form of *Culex pipiens* L., not occurring in America. The true *nigritulus* of Zetterstedt has been referred by Edwards as a synonym to *Aëdes cinereus* Meigen (The Entomol., 1912, 263, 1912).

Digitized by Google

CULEX PROXIMUS Dyar & Knab.

Culex regulator Busck (in part), Smiths. Misc. Colls., quart. iss., lii, 67, 1908.
Culex proximus Dyar & Knab, Proc. Ent. Soc. Wash., xi, 38, 1909.

ORIGINAL DESCRIPTION OF CULEX PROXIMUS:

The genitalia have the basal projection of the harpes long and curved. Harpagones divided into two plates, the upper one very irregularly shaped and toothed, a large blunt tooth at the bottom, long and curved, a similar but shorter one at the top with a group of smaller ones between; a long sharp tooth arising in a different plane from the others and exceeding any of them in length; lower plate concave, broad, with narrowed rounded tip. The plate is shown fully extended in the figure and appears very broad in comparison with some of the other figures, for example *restuans*, but this difference is due to the position of the parts in the slide. The species is especially distinguished by the length of the lateral tooth of the harpagones, which exceeds all the other teeth in length.

Our specimens of this species come from the Canal Zone, Panama, and are in part those referred to by Mr. Busck as *Culex regulator* (Smiths. Misc. Colls., quart. iss., LII, 67, 1908). *Culex regulator* is a synonym of *Culex similis*, to which this species is closely allied, but we believe that the Central American form has departed widely enough from the common stock to deserve specific distinction. *Culex similis*, therefore, exists in the Antilles, gives rise to a race, *lachrimans*, in the Guianas, and develops a separate, but closely allied species, *proximus*, in Central America. This is a parallel development to that of *Culex quinquefasciatus*, referred to above, with its race in the arid regions of North America, developing a separate species upon the Pacific coast.

DESCRIPTION OF FEMALE, MALE, AND ADULT OF CULEX PROXIMUS:

Female.—Proboscis moderate, uniform, clothed with black scales, somewhat paler beneath, particularly towards middle; labellæ long, conically tapered, dark; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, rather slender, about one-fourth as long as proboscis, black scaled, setæ rather coarse. Antennæ moderate, joints subequal, rugose, coarsely pilose, black; tori subspherical with a cup-shaped apical excavation, dirty brown; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, blackish, nude. Eyes black. Occiput brown, clothed with narrow, curved scales on vertex, flat ones on sides, brownish white, margin of eyes and lower part of sides white; many erect, forked black scales on vertex; a row of bristles along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with a few pale scales and black bristles. Mesonotum dark brown, clothed with minute, hair-like coppery-brown scales; setæ coarse, black. Scutellum trilobate, scales paler than those on mesonotum, each lobe with a group of black bristles. Postnotum elliptical, prominent, blackish, nude, paler on sides, with a dorsal carina. Pleuræ and coxæ dark with a greenish tint, with patches of elliptical white scales and rows of pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; vestiture above black with a faint brownish luster, each segment except the first with a very narrow, transverse, uniform basal band of dull-white scales, expanded on sides to form large lateral triangular basal spots, eighth segment white scaled at sides; venter white scaled with black apical bands; hairs at apices of segments rather coarse, pale.

Wings moderate, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant about its own length from anterior cross-vein; scales of veins brown with a blue reflection on costa, outstanding ones linear, denser towards apex of wing. Halteres whitish with dark knobs.

Legs moderate, vestiture black with a bronzy and bluish reflection and a pale-bronzy luster beneath; femora white scaled beneath to tips; knees narrowly pale-scaled; tibiæ pale beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Digitized by Google

Male.—Proboscis long, straight, slender, gradually enlarged towards apex. Palpi long and slender, tip of long joint and last two joints somewhat thickened and with numerous long black hairs, exceeding the proboscis by the length of the last joint; vestiture of bronzy-black scales. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others moderately short, white, with broad black thickened rings at insertions of hair-whorls; hairs long, dense, black. Coloration similar to the female. Wings hardly narrower than in the female, the stems of the fork-cells about the same, scales on forks of second vein and at tip of third vein distinctly ovate, broadest towards tip of wing. Abdomen long, slender, somewhat broadened towards apex, segmental bands broad, occupying nearly basal thirds of segments, laterally produced on sixth and seventh segments; sides of abdomen with long yellowish ciliation. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.7 mm.

Type: No. 12208, U. S. Nat. Mus.

Genitalia (plate 18, figs. 132 and 133): Side-pieces slender, over twice as long as wide; lateral prominence near apex, quadrate, bearing three rods, a leaf-like appendage and a seta. Clasp-filament moderate, slightly enlarged at base, with a small terminal claw. Harpes with inner branch thick, with a rounded tuft of terminal spines, outer branch short and inconspicuous. Harpagones of several large plates divided into large projecting teeth. Basal appendages rounded, setose.

Larva, Stage IV (plate 101, fig. 334).—Head rounded, wider than long, widest through eyes; antennæ long, rather stout, spinose towards base, a large tuft beyond middle, part beyond it slender; dorsal head-hairs in threes, ante-antennal tufts multiple. Thorax with skin finely spiculate; lateral abdominal hairs in fives on first segment, threes on second, twos on third to sixth; lateral comb of eighth segment of many spines in a large triangular patch. Air-tube about seven times as long as wide, gradually tapered outwardly, pecten reaching less than basal third, of small evenly spaced teeth; four tufts beyond pecten, the two central ones moved laterad out of line, the two basal single-haired and long, the two outer ones double and short. Anal segment about as long as wide, ringed by the plate; dorsal tuft of three hairs of different lengths on each side; lateral hair single, small; ventral brush well developed, confined to the barred area. Anal gills rather long, broad, conically tapered, subequal.

Mr. Jennings found the larvæ in a tub of water used for cattle.

Panama.

Taboga Island, Panama Bay (A. H. Jennings); Empire, Canal Zone (A. H. Jennings).

The specimens referred to by Mr. Busck as *Culex regulator*, we find upon further study to be in part *Culex reflector* and in part *Culex proximus*.

CULEX ABOMINATOR Dyar & Knab.

Culex abominator Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 257, 1909.
Culex abominator Thibault, Proc. Ent. Soc. Wash., xii, 20, 1910.
Culex abominator Coad, Can. Ent., xlv, 265, 1913.

ORIGINAL DESCRIPTION OF CULEX ABOMINATOR:

With the general characters of *C. pipiens* Linn., but separable from it by the broader ovate wing-scales and the distinct banding on the under side of the abdomen.

Ten specimens, Tutwiler, Mississippi, August 2, 1904 (H. S. Barber); Rives, Tennessee, July 27 (H. S. Barber); Como, Franklin Parish, Louisiana, August 20 (G. E. Beyer); Victoria, Texas, July 28, 1904 (E. G. Hinds); Plano, Texas, September (E. S. Tucker).

Type no. 12103, U. S. N. M.

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX ABOMINATOR:

Female.—Proboscis rather long and slender, uniform, clothed with black scales; labellæ long, conically tapered, dark; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi stout, one-fifth as long as proboscis, black scaled, setæ rather coarse. Antennæ moderate, joints subequal, rugose, coarsely pilose, black; tori subspherical with a cup-shaped apical excavation luteous, brown on inner side; hairs of whorls sparse, moderate, black; second joint scarcely enlarged, pale at base. Clypeus rounded triangular, prominent, blackish pruinose. Eyes black. Occiput brown, clothed with yellowish-white scales on vertex, narrow curved ones on median line, flat ones on sides; margin of eyes and lower part of sides white; scattered erect, forked pale scales on vertex; a row of bristles along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with a few pale scales and black bristles. Mesonotum brown, clothed with rather large, narrow, curved dull golden scales, those around ante-scutellar space paler; setæ rather long, coarse, black. Scutellum trilobate, brown, with narrow pale golden scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ brown, with patches of elliptical white scales and rows of pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; vestiture black above with a faint-brownish luster, each segment except the first with a very narrow, transverse, uniform basal band of dull-white scales, band on second segment produced in middle; bands expanded on sides to form large lateral triangular spots, visible dorsally on sixth and seventh segments; eighth segment dark scaled; venter black scaled, each segment with a rather broad white basal band; hairs at apices of segments rather coarse, pale; tip densely bristly.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell much shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins dense, outstanding ones on second, third and fourth veins narrowly ovate, those on fifth and sixth veins ligulate; scales bronzy brown, with a blue reflection on costa. Halteres whitish with large black knobs.

Legs moderate, vestiture black with a bronzy and bluish reflection, femora whitish scaled beneath to tips; knees and apices of tibiæ narrowly white; tibiæ and tarsi black scaled with bronzy and blue luster. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis long, straight, slender, gradually and slightly enlarged towards apex, entirely black scaled. Palpi long and slender, scarcely enlarged towards apex, exceeding proboscis by nearly the length of the last two joints, apex of long joint and the last two joints with sparse stiff black hairs; vestiture bronzy black, long joint with a very narrow pale ring before middle. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others moderately short, whitish, with black rings at insertions of hair-whorls; hairs long, dense, black. Coloration similar to the female; vestiture of mesonotum somewhat paler. Abdomen depressed, gradually enlarged towards apex; dorsal bands medianly produced on second and third segments; lateral ciliation moderately long, rather abundant, pale brown. Wings scarcely narrower than in female, venation similar, vestiture also similar. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 10, fig. 69): Side-pieces much enlarged, subspherical, excavated on inner side, as broad as long; inner process divided, outer part columnar, bearing four rods with hooked tips and a large, distorted leaf-like appendage; inner portion furcate, inner limb very short, each bearing a filament

Digitized by Google

with curved and expanded tip; clasp-filament large, slightly constricted beyond middle, inflated at outer third and bearing a row of hairs outwardly, a stout claw before tip, tip pointed and bearing a stout inserted spine. Harpes with inner branch long and slender, bearing a few spines at tip. Harpagones divided into several lamellæ, all rather small. Basal appendages minute, elliptical, oblique, setose. Last segment of abdomen divided along ventral line, widely open posteriorly.

Larva, Stage IV (plate 104, fig. 348).—Head subquadrate, broad, widest through eyes; antennæ long, stout, a tuft at outer third, part beyond more slender, shaft spined; dorsal upper head-hairs a short tuft, lower long, single; ante-antennal tuft multiple. Body densely pilose, lateral abdominal hairs in threes. Lateral comb of eighth segment of few spines in an elongated patch, single large spines above, mixed with smaller ones centrally and becoming two rows deep below. Air-tube six or seven times as long as wide, gradually and slightly tapering outwardly, pecten of rather long teeth, longer outwardly and reaching to basal third of tube; five long, multiple hair-tufts along posterior margin beyond pecten, none out of line; two small tufts on dorsal aspect; dorsal hooks large, simple. Anal segment twice as long as wide, ringed by the plate, which is pilose like the body; dorsal tuft of two long hairs and one short hair on each side; ventral brush large, confined by the chitinous ring. Anal gills small.

We quote the following observations on the habits from a letter by Mr. J. K. Thibault, Jr., of Scott, Arkansas.

"*Culex abominator* is one of the most abundant and annoying species here, especially along ponds and streams, *in woods*. It is to those who spend much time in such places a veritable pest from July until the middle of October. They are here simply by billions, and unless one has sufficient protection against them, he had best stay out of the 'brakes.' The bite is very irritating, causing an intense burning and swelling, not unlike that caused by the bite of *Aëdes calopus*. They bite most at dusk and early in the morning, yet in woods they never entirely cease their attentions even at midday. And if one happens to be two or three hundred yards out in a 'cypress brake,' where there is abundant shade, they bite about as badly at noon as at any other time of the day. Out here they breed in the hollow cypress trees and stumps by millions, many of them probably never going ashore. I have taken them in goodly numbers in the parks and cemeteries of Little Rock, and found them occasionally about dwellings in the heart of the city. About dwellings situated near woodland streams they are quite abundant. In such localities they readily enter houses and never miss an opportunity to bite. They are also quite troublesome to live stock and poultry; horses, mules and chickens in particular. With the exception of *Anopheles quadrimaculatus*, this species is the most abundant in buggies and other covered vehicles. In these they travel many miles and this is certainly a most frequent means of their dissemination. I have taken them ten or fifteen miles in this way and it was quite interesting to observe their actions at such times. So long as the buggy is in motion, they can not be made to take flight, unless you simply tear them loose by force. I have purposely put up the back curtain and driven at high speed in order to create a strong draught through the buggy. I have also driven quite fast over very rough ground, in order to shake them loose, yet they absolutely refused to fly unless you tore them loose with hands or something equally substantial. It is a common sight to see several hundred of these mosquitoes in buggies that have stood unused over night. When the buggy stops after being driven, the mosquitoes come out and begin biting the horse or any other warm-blooded animal close by. While taken from March to November, this is really a summer mosquito, being by far most abundant from

Digitized by Google

July to October." Later Mr. Thibault published the statement that this species "breeds in permanent bodies of water, preferring those thickly overgrown with aquatic plants." He states that the males are generally in evidence after June 10.

Mr. Coad has found the larvæ abundant under the conditions last described on the lower Illinois River. Recently he has published the following data on the eggs and the habits of the larvæ. The aquatic vegetation is composed of *Ceratophyllum, Potamogeton, Lemna* and other plants; this growth is more or less impervious to fish, while it still leaves sufficient space for the mosquito larvæ. The eggs "are laid on the upper surface of *Lemna* fronds in rather large masses. In only one instance were the eggs found . . . . on the edge of a *Potamogeton* leaf which was floating on the water. They are quite firmly attached to the frond and to each other. The base of the egg is truncate, facilitating a firm attachment. The eggs are very black. . . . They are always near the margin of the frond and, upon hatching, the young larvæ immediately wriggle off into the water." It appears from Mr. Coad's figure, that there are about 90 eggs in a mass, arranged in about six rows.

Southern Mississippi Valley.

Tutwiler, Mississippi, August 2, 1904 (H. S. Barber); Rives, Tennessee, July 27 (H. S. Barber); Victoria, Texas, July 28, 1904 (E. G. Hinds); Plano, Texas, September (E. S. Tucker); Como, Franklin Parish, Louisiana, August 20, 1901 (G. E. Beyer); Scott, Arkansas, October 8, 1908 (J. K. Thibault, Jr.); Scott, Lonoke County, Arkansas, August 11, 1909 (J. K. Thibault, Jr.); Havana, Illinois (B. R. Coad).

CULEX INVESTIGATOR Dyar & Knab.

Culex investigator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 216, 1906.

ORIGINAL DESCRIPTION OF CULEX INVESTIGATOR:

Antennæ with the tuft slightly beyond the middle, dark; head hairs single; body pilose; lateral hairs in twos after the first abdominal segment. Air tube five-and-a-half times as long as wide, rather markedly tapered on basal third; pecten of long teeth, reaching two-fifths, followed by five rather short hair tufts.

Taken by the junior author in a pool beside the railroad track, three miles from town, Santa Lucrecia, Mexico. Mr. Coquillett seems not to have named the adult although one was bred.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender..	5
5.	Air tube four times as long as wide or over.....	7
7.	Anal appendages four, normal.....	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout.....	19
19.	Air tube with long, well-defined tufts.....	20
20.	Body spicular-pilose	21
21.	Five tufts on posterior margin of tube subequal in length, short; lateral abdominal hairs in twos on segments 3 to 5.....	22
22.	Air tube 6 × 1; upper head hair single; pecten long.....	*investigator*

DESCRIPTION OF LARVA OF CULEX INVESTIGATOR (ADULT UNKNOWN):

Larva, Stage IV (plate 105, fig. 351).—Head large, broad, rounded, widest through eyes, bulging on sides, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, curved, thick and spined on basal two-thirds, with a large tuft from a notch; two long subapical setæ, a long seta, a short one and a digit at tip. Upper pair of dorsal head-hairs small, in fours, lower pair long, single; ante-antennal tuft multiple. Mental plate triangular, straight on sides, with a large central tooth and five on each side, basal two a little more remotely spaced. Mandible quadrangular; three filaments and a tuft of hairs

Digitized by Google

before tip; an outer row of cilia from a collar; a row of rounded transverse prominences within outer margin bearing long hair-tufts; dentition of four irregular teeth, scarcely elevated on a process; a spine before, a long smooth filament and small row of feathered hairs within; process below obscurely furcate, with a transverse and longitudinal row of hairs and slight terminal tufts; basal angle rather small, with a row of stout hairs within and two separated hairs below; a basal row of long hairs. Maxilla elongate, conical, divided by a suture; inner half with long spines on margin mixed with short stiff hairs, a row of cilia near suture basally; a row of long hairs at tip continued along suture; outer half with two filaments at basal third next suture and a single one on other side of suture at apical third. Palpus very small with four long slender digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, in twos on second to fifth, in threes on sixth; skin pilose. Air-tube long, rather wide at base and tapering to near the apex, nearly six times as long as wide; pecten long, reaching basal two-fifths; single teeth broad with numerous serrations on one side; five short multiple nearly equal tufts on posterior margin beyond pecten; apical hooks large, each with a tooth. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, a little widened at tip, with apical fringe of spinules. Anal segment nearly twice as long as wide, ringed by the plate; dorsal tuft a pair of long hairs and a short one on each side; ventral brush moderate, confined to the barred area. Anal gills rather short, not as long as the segment, uniformly tapered.

The larvæ live in ground-pools. Mr. Knab obtained them from a reedy pool beside a railroad track.

Mexico.

Santa Lucrecia, June 20, 1905 (F. Knab).

We have been unable to find the adults bred from these larvæ; the specimens must have been lost or destroyed before they were examined. We have not met with the species again.

CULEX ERRATICUS (Dyar & Knab).

Melanoconion atratus Dyar (not Theobald), Journ. N. Y. Ent. Soc., xiii, 26, 29, 1905.
Mochlostyrax erraticus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 222, 224, 1906.
Melanoconion atratus Coquillett (in part, not Theobald), U. S. Dept. Agr., Bur. Ent., Tech. ser. 11, 24, 1906.
Mochlostyrax erraticus Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.

ORIGINAL DESCRIPTION OF MOCHLOSTYRAX ERRATICUS:

The larva resembles that of *Culex salinarius*. The skin is densely covered with minute spiculæ, making it appear pilose. The air tube is long and straight, about six times as long as wide, has the pecten small, running to the basal third, followed by five moderate tufts on the posterior edge and two very short dorsal ones. The lateral comb of the eighth segment has the spines in a rather irregular row, not in the normal perfectly straight line, yet not doubled. We have the species from Dr. Dupree, Baton Rouge, Louisiana. It was identified as "*Melanoconion atratus* Theob." by Mr. Coquillett, but of course erroneously.

The following is an abstract of the table:

1. Antennæ with tuft from a notch beyond middle..... 2
2. Air tube over four times as long as wide, slender, scarcely tapered, with slight terminal setæ..... 3
3. Bars of comb in an irregular row, body pilose..... *erraticus*

DESCRIPTION OF FEMALE AND LARVA OF CULEX ERRATICUS (MALE UNKNOWN):

Female.—Proboscis rather long, apical third moderately thickened, clothed with blackish scales. Palpi short, rather stout, about one-sixth as long as the proboscis, clothed with brown scales. Antennæ rather long, segments subequal, somewhat stouter than usual, rugose, pilose, black, the whorls of a few long

Digitized by Google

hairs; cilia coarse and rather long; tori subspherical with a cup-shaped apical excavation, luteous, brown on inner side. Clypeus large and very prominent, constricted at base, rounded in front, brown. Occiput dark brown, clothed on vertex with broad, flat scales and narrow, curved ones intermixed; the narrow, curved ones golden, flat ones black with a gray luster; ocular margin and cheeks white scaled; scattered erect, forked scales above, black on sides, brown ones in the middle.

Prothoracic lobes elliptical, remote dorsally, clothed with whitish scales and dark setæ. Mesonotum brown, clothed anteriorly with dull golden scales enclosing two dark spots, posteriorly bronzy-brown scales with six ill-defined golden median, submedian, and lateral longitudinal stripes; scales rather large and dense, narrow, curved; setæ coarse and abundant, particularly posterior ones. Scutellum trilobate, with median lobe very large, clothed with pale-golden scales, each lobe with a tuft of long coarse setæ. Postnotum elliptical, brown, nude. Pleuræ brown, coxæ paler, with patches of white scales and rows of short brown bristles.

Abdomen subcylindrical, tip truncate; vestiture above of sooty scales; second segment with a median basal triangular yellowish-white patch or narrow band mesially produced and similar small ones on third, fourth, and fifth segments; segments with large lateral patches of coarse white scales occupying basal halves; venter clothed with sooty scales with whitish basal bands on all segments; posterior margins of segments with coarse and long pale cilia.

Wings rather broad; second marginal cell very long, about six times as long as its petiole; second posterior cell much shorter; basal cross-vein more than its own length before anterior cross-vein; scales brown, rather broadly linear, long and dense, those near tip of wing broadened, giving the effect of greater density.

Legs moderate, vestiture black with a bronzy and blue luster; femora pale beneath, except at apices; knees and apices of tibiæ yellowish. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Larva, Stage IV (plate 105, fig. 349).—Head rounded quadrate, wider than long, sides nearly straight, a distinct notch at insertion of antennæ, front margin arcuate. Antennæ cylindrical, curved, a notch at outer third bearing a very large hair-tuft; densely spined except towards tip; two long subapical hairs, apically one long and one short one and a digit on a pedestal. Eyes larges, transverse, pointed. Upper pair of dorsal head-hairs small, multiple, lower pair long, single; ante-antennal tuft multiple. Mental plate small, a single large tooth and four on each side, the last much smaller. Mandible quadrangular, short and thick; nearly square in outline; two filaments before tip; a row of cilia from a collar; dentition in line with outer margin; a single large tooth with two small ones below on a slight process; two spines before, two large and a series of small teeth below, a broad smooth filament, a smaller serrate one and six feathered hairs within; process below swollen, constricted before tip, with two rows of hairs; basal angle small, slender; a row of hairs within; a row of long hairs at base. Maxilla conical, divided by a suture; inner half hairy toward base; a row of long hairs at tip along the suture; outer half with some hair next the suture, two filaments near base and a small subapical spine. Palpus extremely small, with four apical digits, which, though small, are half as long as palpus. Thorax rounded, wider than long; hairs abundant and very long, subdorsal prothoracic ones single. Abdomen moderate, anterior segments shorter; lateral tufts multiple on first three segments, triple on fourth to sixth; secondary hairs in long tufts on third to sixth segments; skin distinctly pilose throughout. Air-tube long and slender, uniform, scarcely tapered, six

Digitized by Google

times as long as wide; pecten running to basal third, followed by a row of five multiple hair-tufts along posterior edge of tube and two slight dorsal ones; single pecten-tooth a short broad spine with three basal branches. Lateral comb of eighth segment of a single irregular row of scales; single scale elongate, tapering to a sharp point, fringed except subapically with sparse slender spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft two long hairs and a shorter one on each side; a single lateral hair; ventral brush well developed, confined to the barred area. Anal gills small, much shorter than the segment tapered to a rounded tip.

The larvæ live in ground-pools, but we have no notes on their habits. Our figure (plate 147, fig. 689) of the eggs was made by Miss E. G. Mitchell, and represents them deposited in a long, narrow raft.

Southern Mississippi Valley.

Baton Rouge, Louisiana (J. W. Dupree); Brownsville, Texas, August 6, 1904 (H. S. Barber); Tutwiler, Mississippi, August 2 (H. S. Barber); Fort Smith, Arkansas, July 7, 1904 (H. S. Barber); Little Rock, Arkansas, July 2, 1904 (H. S. Barber); Rives, Tennessee, July 27, 1904 (H. S. Barber); Victoria, Texas, July 28, 1904 (E. G. Hinds); Jacksonville, Florida, October 12, 1908 (H. Byrd).

This species was originally identified as *Culex atratus*, but it is in fact distinct from that Jamaican species. We have lately received captured adults from Florida, but must await the receipt of their larvæ for positive determination of the species in that locality.

CULEX AGITATOR Dyar & Knab.

Culex humilis Pazos (not Theobald), Bull. Soc. ent. France, 134, 1904.
Mochlostyrax cubensis Dyar & Knab (not *Culex cubensis* Bigot), Journ. N. Y. Ent. Soc., xiv, 223, 225, 1906.
Culex agitator Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 100, 1907.
Culex agitator Pazos, Anal. Acad. Cien. méd. fís. y nat. de la Habana, xlv, 425, 1908.
Culex agitator Pazos, San. y Ben., ii, 49, 559, 1909.
Culex agitator Theobald, Mon. Culic., v, 614, 1910.

ORIGINAL DESCRIPTION OF MOCHLOSTYRAX CUBENSIS:

The specimens are badly damaged, but enough is left to give the specific characters. The tube is of the same shape as in *caudelli* and had apparently similar hair tufts. Pecten very long, not reaching half way along the tube. Lateral comb of the eighth segment of eight bars, stout, well separated, the upper ones smaller.

We have the specimens from Havana, Cuba, from Mr. John R. Taylor as "*Melanoconion atratus* Theob." the determination made by Mr. Coquillett, we believe.

The following is an abstract of the table:

1. Antennae with the tuft from a notch beyond the middle..... 2
2. Air tube not over four times as long as wide, stout at base and tapering, slightly curved forward with two stout hooks at tip... 4
4. Bars of comb in a straight row; body glabrous..... 5
5. Comb of only eight bars..... *cubensis*

ORIGINAL DESCRIPTION OF CULEX AGITATOR:

We propose this name to replace *Mochlostyrax cubensis* Dyar & Knab, since when this species is transferred to *Culex*, as will follow from *Mochlostyrax* not being separable from *Culex* in the adult state, it is preoccupied by *Culex cubensis* Bigot.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX AGITATOR:

Female.—Proboscis moderate, slightly expanded at tip, vestiture black with bronzy luster, labellæ conically tapered, paler; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as proboscis, uniform, dark brown, a few outstanding hairs at base. Antennæ moderate; joints subequal, rugose, pilose, black, second joint slightly longer than third; tori subspherical, with a cup-shaped apical excavation, brown

Digitized by Google

within; hairs of whorls sparse, rather long. Clypeus rounded, convex, brown, nude. Occiput blackish, with a few narrow, curved scales behind, the remainder broader, flat, bronzy black, gray in some lights, intermixed with erect, forked black ones; a narrow margin along eyes and the cheeks with broad dull-white scales; a row of black setæ along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and black bristles. Mesonotum dark brown, clothed with narrow, curved, uniformly bright bronzy brown scales; bristles long, coarse, black. Scutellum trilobate, with similar vestiture to mesonotum, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ brown, with a few flat white scales; coxæ luteous.

Abdomen subcylindrical, truncate at tip; dorsal vestiture black with a slight bronzy and blue reflection, a small basal segmental whitish spot on second to fifth segments; a row of lateral, basal, segmental, triangular white patches; venter banded with black and white, the basal halves of segments white; hairs at ends of segments coarse, pale; last segment bristly at tip.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant about twice its own length from anterior cross-vein; scales of veins bronzy brown, outstanding ones on second to fourth veins towards tip of wing narrowly ovate, dense, those nearer base long, linear. Halteres whitish, knobs darker.

Legs moderate; vestiture bronzy brown, with a pale shade beneath; femora with a blue reflection, white beneath nearly to tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wings 2.8 mm.

Male.—Proboscis long, straight, gradually enlarged towards apex, black scaled. Palpi exceeding the proboscis by more than the length of the last joint; last two joints slightly thickened, and with tip of long joint densely hairy; vestiture bronzy black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, ringed with black at insertions of hair whorls; hair dense, brown. Coloration similar to the female. Recumbent broad scales on occiput whitish, nearly as pale as ocular margins. Wings a little narrower than in the female, the stems of the fork-cells nearly the same, vestiture somewhat sparser. Abdomen with lateral white spots large and almost joining the dorsal spots to form bands; lateral ciliation coarse, pale brown, abundant and irregular. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 9, fig. 61): Side-pieces over twice as long as wide, tips conically tapered, outer prominence slender, truncate, bearing three coarse setæ and a large leaf-like appendage, inner prominence situated near middle, partly divided into four portions, each progressively shorter towards base and each bearing a stout terminal seta, outer longer prominence with another seta on its exterior aspect. Clasp-filament moderate, enlarged at base, simple, with articulated terminal spine. Harpes produced into a long arm expanded and bent at tip and bearing a row of coarse separated teeth. Harpagones elongate, slender, expanded and bent at tip, arising from a plate with revolute margins, forming a cylinder open at one side.

Larva, Stage IV (plate 112, fig. 381).—Head transverse, widest through eyes, slightly convex on sides, a large notch at insertion of antennæ, front margin obtusely arcuate. Antennæ long, slightly curved, thick and well spined on basal two-thirds, with a large tuft from a notch; two long setæ shortly before tip, a moderate seta, a short one and a digit at tip. Mental plate small, triangular, with a large stout central tooth and seven on each side, the last one small and remote. Mandible quadrangular; three long filaments and a tuft of hairs before

Digitized by Google

tip; an outer row of cilia from a long collar; a row of conical prominences within outer margin, each bearing a tuft of short hairs; dentition within margin, a single stout tooth with a row of thick spines below; a long smooth filament, a serrate one and a row of short hairs within; process below continuous with outer margin, obscurely furcate, with a row of hairs above and a tuft at tip of each limb; basal angle narrowly prominent, within with a row of stout hairs with divided tips, in line with a row of similar longer basal hairs. Maxilla elongate, conically rounded at tip, divided by a suture; inner half with a row of long hairs on margin, two short rows of cilia within and a short stout articulated spine near tip; a row of long hairs at tip running down along the suture almost to base; outer half with two small filaments at basal fourth. Palpus rudimentary, with four long apical digits. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter; skin glabrous. Air-tube conically tapered, arcuate on posterior margin, three times as long as wide; pecten of long sparse spines, reaching over basal third; single spine densely serrate on one side; nine long hair-tufts on posterior margin, three of them within pecten; a pair of large recurved hooks at tip, each with a median tooth. Lateral comb of eighth segment of eight long smooth spines in a straight row. Anal segment longer than wide, ringed by the plate; ventral brush confined to the barred area; anal gills slender, about as long as the segment.

Life history and habits unknown.

Island of Cuba, West Indies.

Havana, October, November 1, 1902 (J. R. Taylor); San Antonio de los Baños (J. H. Pazos).

CULEX CORRIGANI Dyar & Knab.

Culex corrigani Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 203, 1907.
Culex corrigani Busck, Smiths. Misc. Colls., quart. iss., iii, 69, 1908.
Culex corrigani Theobald, Mon. Culic., v, 614, 1910.

ORIGINAL DESCRIPTION OF CULEX CORRIGANI:

♀.—Proboscis long and slender, distinctly swollen at the apex, black scaled, not ringed; palpi very short, brown scaled, occiput brown scaled, the eyes with distinct white margins; mesonotum rather light-brown scaled, with a darker shade on the posterior portion and with many long coarse black bristles; metanotum very light brown; pleura pale greenish; abdomen somewhat depressed, truncate at the tip, clothed above and at the sides with black scales with a brownish luster, beneath greenish-white scaled along the median line; legs black with bronzy luster, claws simple; scales of the wing-veins brown, long and narrow. Length, 3 mm.

One specimen, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvae in water in bamboo joints.

Type.—No. 10870, U. S. National Museum.

Named, at the suggestion of Mr. Busck, in honor of Mr. John Corrigan, Sanitary Inspector of Tabernilla.

The larva is allied to that of *Culex conservator* Dyar & Knab, but differs in the long slender antennæ on which the tuft is placed very near the apex, and in having six single hairs on the air-tube.

DESCRIPTION OF FEMALE AND LARVA OF CULEX CORRIGANI (MALE UNKNOWN):

Female.—Proboscis moderately long, slender, enlarged at tip, clothed with rough black scales, setæ rather long, outstanding, sparse, labellæ small, conically tapered. Palpi small, about one-seventh as long as proboscis, blackish scaled. Antennæ moderate, joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black. Clypeus short, rounded, dark brown, with a white pruinosity. Eyes black. Occiput black, clothed with narrow, curved pale-brown scales and numerous erect, forked, long pale-brown scales all over surface, a row of flat white scales along margins of eyes, cheeks not differentiated; two coarse black bristles projecting forward between eyes, some fine black setæ along margins of eyes.

Digitized by Google

Prothoracic lobes elliptical, remote dorsally, luteous, with a few narrow pale scales and a few coarse black bristles. Mesonotum pale brown, luteous in front, a dark diffuse spot at roots of wings; vestiture of rather coarse, light bronzy-brown, narrow, curved scales, those along anterior margin and angles pale straw colored, three very narrow bare longitudinal lines extending from anterior margin to antescutellar space; bristles numerous, coarse and long, black. Scutellum trilobate with a few small, narrow brown scales, each lobe with a group of long black bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ very pale luteous, pleuræ with a green tint, a few black bristles.

Abdomen elongate, subcylindrical, depressed, truncate at tip; vestiture dull black with a slight bronzy reflection dorsally and on the sides; venter dirty greenish white-scaled.

Wings moderate, hyaline; petiole of second marginal cell less than half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins moderately dense, broadly linear, brown with a bronzy and blue reflection on costa, scales denser and slightly broader on forks of second vein and apices of third and fourth veins. Halteres with yellowish white bases and black knobs.

Legs rather long; vestiture black with a bronzy and bluish reflection; femora paler beneath to near apices; scales of tibiæ somewhat roughened, especially towards tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Larva, Stage IV (plate 110, fig. 371).—Head transversely elliptical, rounded, a lobe projecting from beneath near base of antennæ. Antennæ large, stout, with a slight notch beyond the outer third with large hair-tuft, the terminal setæ longer than the tuft. Lower pair of dorsal head-hairs long and single, upper pair in fours; ante-antennal tufts multiple. Lateral comb of the eighth segment a large patch of scales over four rows deep. Air-tube long and slender, 11 x 1, the pecten moderate and rather sparse, situated on the basal fourth; four single hairs beyond pecten, evenly spaced, with a minute tuft slightly out of line between the last two. Anal segment nearly twice as long as wide, ringed by the chitinous plate; ventral brush well developed, confined to the barred area; two long single dorsal hairs on each side. Anal gills four, equal, shorter than the anal segment.

The larva was found in water in a broken bamboo-joint by Mr. Busck.

Panama.

Tabernilla, Canal Zone, July 18, 1907 (A. Busck).

Culex corrigani was described from a single female specimen, and we have received no further material. It is evidently very closely related to *Culex conservator,* and may be identical with that species. We are unable to point out tangible differences in the females with the scant material at hand. However, the larvæ show differences which in other forms have proved specific. No doubt the male has short palpi, as in *conservator.* The female agrees closely with that of *conservator* in the peculiar character of the vestiture of the occiput and mesonotum, in the scaling of the wings, and in the diffuse dark integumental spots over the roots of the wings; this latter character shows the relationship of these species with *C. ocellatus,* in which species the shortening of the male palpi has not progressed so far. Our specimen of *C. corrigani* is much larger than any *conservator* and shows a paler mesonotum with broader zone of white scales along the anterior margin.

Digitized by Google

CULEX ATRATUS Theobald.

Culex atratus Theobald, Mon. Culic., ii, 55, 1901.
Culex atratus Giles, Gnats or Mosq., 2 ed., 459, 1902.
Melanoconion atratus Theobald, Mon. Culic., iii, 238, 1903.
Culex atratus Blanchard, Les Moustiques, 335, 1905.
Melanoconium atratum Blanchard, Les Moustiques, 395, 1905.
Melanoconion atratus Dyar, Journ. N. Y. Ent. Soc., xiii, 55, 1905.
Melaniconion atrata Felt. Bull. 97, N. Y. State Mus., 487, 1905.
Melanoconion atratus Grabham, Can. Ent., xxxvii, 404, 1905.
Melanoconion atratus Theobald (in part), Mosq. or Culic. of Jamaica, 28, 1905.
Culex atratus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 220, 1906.
Melanoconion atratum Peryassú, Os Culic. do Brazil, 242, 1908.
Melanoconion atratus Theobald (in part), Mon. Culic., v, 456, 1910.

ORIGINAL DESCRIPTION OF CULEX ATRATUS:

Thorax deep umber-brown to almost black. Abdomen black, sometimes with a dull coppery-brown sheen, each segment with small lateral basal white spots, most distinct on the apical segments; venter with broad, apical, creamy bands. Legs dark brown to almost black, except at the base; a pale knee spot, and another at the tibio-metatarsal joint. Fore and mid ungues of the ♂ unequal, the larger with a long median tooth, the smaller with a sharp basal tooth; hind equal and simple.

♀. Head with creamy-white curved scales in the middle, pale flat ones at the sides, and with numerous black forked upright ones, which expand out very much at the top; proboscis black scaled, thickened towards the tip, apex pale; palpi short, black scaled; antennæ brown, with pale pubescence, basal joint and base of the second joint testaceous; eyes deep black, purplish in some lights, a narrow pale border surrounding them.

Thorax deep umber-brown to black, covered with narrow, deep-brown, curved scales, and with two rows of long black bristles, and with numerous black bristles at the sides; scutellum dark ochraceous-brown, with narrow dark scales and black bristles; metanotum brown; pleuræ paler, *with a row of black bristles* down to the mid coxæ.

Abdomen covered with deep black scales, and each segment with a small basal whitish spot on each side, which does not show dorsally on all the segments; posterior borders with golden bristles; in some specimens the abdomen has a coppery-brown appearance, and the lateral spots are only present on the last few segments; venter with broad basal bands of creamy scales and few dusky ones forming apical bands to the segments.

Legs black, coxæ grey, and also the ventral surface of the femora, except just at the apex; apices of the femora and tibiæ swollen; a small pale spot at the tibio-metatarsal joint, and a small indistinct deep-yellow one at the knee; legs rather long; they also show a deep bluish tinge in some lights.

Wings a little longer than the body, with dark blackish-brown scales, very dense and broadish on the first, second, third, and apical portions of the fourth veins; the stems of the fourth, the upper arm of the fifth and the sixth with long thin scales on each side in addition; the lower branch of the fifth with thin scales on one side only, and the stem with no long scales; first sub-marginal cell considerably longer but the same width as the second posterior cell, more than three times longer than the stem, its base nearer the base of the wing than that of the second posterior cell; second posterior cell with its stem about half the length of the cell; posterior cross-vein about twice its own length distant from the mid cross-vein. Halteres with pale stem, with a dark line down one side, and a fuscous knob.

Length.—2.5 to 3 mm.

♂. Head with pale curved creamy scales in the middle, flat dusky and then dirty-white ones at the sides, numerous black upright forked scales as in the female, but leaving a bare line in the middle of the head, and more dense on each side of it; palpi and proboscis blackish-brown, with steely metallic reflections in some lights; palpi not quite as long as the proboscis, the antepenultimate joint much expanded at the apex; penultimate joint longer than the apical joint; antennæ banded dark brown and dirty-white; plumes of antennæ and palpi blackish-brown.

Ungues of fore and mid legs unequal, both with a tooth, that of the smaller very pointed and near the base; hind ungues equal.

Length.—2.5 mm. to 3 mm.

Habitat.—Jamaica (Dr. Grabham, 8, 2, 1900, and F. Cundall, 7, 12, 1899); Trinidad (Urich).

Time of capture.—November and December.

Observations.—A small dark mosquito, which is clearly distinct, and which has very characteristic wing scale-ornamentation, which should at once enable the col-

Digitized by Google

lector to identify it. The swollen proboscis in the ♀ is also a marked character; so also are the swollen apices of the tibiæ. Dr. Grabham states that it is the usual swamp form. "I strongly suspect," he says, "the male sucks blood, but have not made definite observations yet." (Sign attached to label X.) Taken by Dr. Grabham (who appends the following note) at Ferry Swamp, in the larval stage; "from stagnant algæ-containing permanent pools. The larvæ feed on algæ."

In a recent letter Dr. Grabham writes: "The small swamp form, a terrible pest in local mangrove swamps; the minnows do not seem to destroy this species."

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX ATRATUS:

Female.—Proboscis slender, moderate, enlarged at tip, labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, black, one-fifth as long as the proboscis, with few outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, black, the second joint a little longer than third; tori subspherical, with a cup-shaped apical excavation, brown; hairs of whorls moderate, sparse, black. Clypeus triangular, convex, brown, nude. Eyes black. Occiput brown, clothed with black mostly broad, flat scales; scales on cheeks below dull white, some erect, forked black ones on nape; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, with a few dark bristles. Mesonotum brown, clothed with rather large and dense uniformly dark-brown, narrow, curved scales; two ill-defined, broad, longitudinal lines formed by coarser suberect scales. Scutellum trilobate, luteous-brown with a few small brown scales on the large mid lobe, each lobe with a group of black bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ luteous, with rows of brown bristles.

Abdomen subcylindrical, truncate at tip; dorsal vestiture black with a slight blue and coppery metallic reflection, a row of small, lateral, basal, segmental, triangular, white patches; venter black scaled with small whitish bands at bases of segments.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about twice its own length distant from anterior cross-vein; scales of veins brown, those on costa with a bronzy and blue luster, outstanding ones on second to fourth veins near tip of wing ovate. Halteres with slender whitish stems and large dark knobs.

Legs moderate, black scaled with a bronzy reflection; femora whitish beneath except tips; knees concolorous. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis long and straight, gradually enlarged towards apex, black scaled with a bronzy luster. Palpi slender, apical portion somewhat enlarged, exceeding the proboscis by more than the length of the last joint; last two and end of long joint, densely hairy; vestiture entirely bronzy brown. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls; hairs long, dense, dull brown. Coloration similar to the female. Wings slightly narrower than in the female, the stems of the fork-cell longer; vestiture sparse. Abdomen elongate, depressed, somewhat thickened apically; basal, segmental white spots larger, visible from above beyond the first three segments; lateral ciliation coarse, brown, irregular. Claw formula, 1.0–1.0–0.0.

Length: Body about 3.5 mm.; wing 2.5 mm.

Genitalia (plate 13, fig. 92): Side-pieces twice as long as wide, stout, conically tapered at tip; a low subapical prominence bearing a leaf-like appendage, a slender median prominence bearing a central large spine and a smaller lateral one. Clasp-filament moderate, enlarged at base, with a small terminal articu-

Digitized by Google

lated spine. Harpes membranous, rounded, bearing a row of long spines on margin. Harpagones broad, flat, tips pointed, inner margin revolute.

Larva, Stage IV (plate 106, fig. 356).—Head subquadrate, nearly straight along posterior margin, much wider than long, widest through eyes; antennæ long and stout, a tuft at outer third, part beyond slender; upper pair of dorsal head-hairs a short multiple tuft, lower pair long, single. Body with skin pilose; lateral hairs in threes on first abdominal segment, in twos on second, in fours on third and fourth, in threes on fifth and sixth. Lateral comb of eighth segment of many spines in a triangular patch. Air-tube slender, about nine times as long as wide, straight, a little enlarged near base; pecten of rather long evenly spaced teeth, running to basal third, followed by five rather short tufts along posterior margin. Anal segment longer than wide, ringed by the plate; dorsal tuft of four hairs of different lengths on each side; ventral brush confined by the chitinous ring. Anal gills short, equal, conically tipped.

The larvæ breed in the mangrove swamps, where they abound. Theobald quotes Dr. Grabham on the habits as follows (Mosq. or Culic. Jamaica, 28, 1905):

"They are taken all the year around. The eggs have not been observed. The larvæ live in permanent algæ-containing pools and feed upon algæ. Minnows frequently occur with them and do not seem to destroy them at all; nor do dragon-fly larvæ. Dr. Grabham says they are easily distinguished from the larvæ of other local culices by their delicate transparent outline, small size, and relatively greater length and fineness of the respiratory siphon. The pupæ have very long cylindrical siphons, and are green in colour; in life the upper two-thirds of the siphons are black or dark gray, in striking contrast to the rest of the body of the pupa, which is very transparent. This small black mosquito is a most troublesome pest in swamps, especially in the local mangrove swamps around Kingston; but it also invades houses where, on account of its small size, ordinary mosquito-netting is of no protection against them. The female bites at all times of the day and night, the bites causing very severe irritation."

Island of Jamaica, West Indies.

Kingston, April, 1906 (M. Grabham).

We recognize this species from the island of Jamaica only. Theobald's reference of it to Trinidad and elsewhere in South America, we consider erroneous, as there was probably some other species which resembled it under observation. The same is true of identifications of this species from the southern United States and elsewhere; in a number of cases we have seen the specimens in question and found that they belong to distinct species.

In the original description Theobald quotes Dr. Grabham as strongly suspecting the male to be a blood-sucker. This surmise is converted into a positive statement by Peryassú, as it would seem, without any basis of fact. No observations have been published which would confirm such a belief.

CULEX IGNOBILIS Dyar & Knab.

Culex ignobilis Dyar & Knab, Proc. Ent. Soc. Wash., xi, 39, 1909.
Culex innobilis Pazos, Sanidad y Benefic., ii, 50, 562, 1909.

ORIGINAL DESCRIPTION OF CULEX IGNOBILIS:

Proboscis and legs without pale rings; proboscis swollen toward the tip; abdomen without dorsal pale bands, dull blackish, lateral spots yellowish white, basally situated on the segments; venter pale-scaled, with indistinct dark bands towards the tip. Occiput with pale scales and erect black forked ones. Scales of the wings broad, many obliquely subtruncate.

Four specimens, San Antonio de los Baños, Cuba (J. H. Pazos).

Type.—No. 12239, U. S. Nat. Mus.

Digitized by Google

DESCRIPTION OF FEMALE OF CULEX IGNOBILIS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, enlarged towards apex, labellæ conically tapered; vestiture brownish black, paler beneath with tip darker; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as the proboscis, black scaled, with a few outstanding setæ. Clypeus broadly elliptical, excavated at base, brownish black, nude. Eyes black. Antennæ with the joints subequal, rugose, pilose, black, second joint somewhat enlarged and paler at base; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, dark brown. Occiput black, clothed with recumbent creamy-white scales, those on the vertex narrow, the rest broad; some erect, forked black scales at sides, cheeks white-scaled; a row of coarse black setæ along margin of eyes.

Prothoracic lobes remote dorsally, clothed with a few pale scales and black setæ. Mesonotum dark brown, rather sparsely clothed with narrow, curved bronzy-brown scales; two indistinct longitudinal bare lines anteriorly; scales around ante-scutellar space paler, coarser, and denser; setæ coarse, black, arranged in longitudinal series. Scutellum trilobate, luteous brown, darker on lobes; clothed with narrow, curved bronzy-brown scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, dark brown, nude, shining. Pleuræ and coxæ pale luteous, with patches of elliptical, flat white scales and rows of small pale bristles.

Abdomen subcylindrical, truncate at tip; dorsal vestiture of dull brownish-black scales, sides with large triangular, basal, segmental, dull creamy-yellow spots; venter creamy-yellow scaled, last segments with indistinct dark apical bands.

Wings rather broad, hyaline; petiole of second marginal cell about one-third the length of its cell, that of second posterior cell much shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; outstanding scales of veins brown, large and rather broadly ovate, in part obliquely subtruncate at their tips, denser on apical portion of wing.

Legs moderate, slender; vestiture dull brownish black, femora pale beneath nearly to tips; tibiæ and tarsi with paler shade beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.8 mm.

Life history and habits unknown.

Island of Cuba, West Indies.

San Antonio de los Baños (J. H. Pazos).

CULEX INHIBITATOR Dyar & Knab.

Culex inhibitator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 216, 1906.
Culex inhibitator Dyar, Proc. Ent. Soc. Wash., viii, 17, 1906.

ORIGINAL DESCRIPTION OF CULEX INHIBITATOR:

Antennæ with the tuft near the outer third, dark; upper head tuft of four, short, lower long and single; body hairy; lateral hairs in twos after the first abdominal segment; tracheæ narrow. Air tube long, 6 × 1, the pecten long and reaching one-third, with five tufts, decreasing in length a little toward tip. Anal segment long, but the gills short.

Collected by Mr. Busck in a slowly running clear cold spring in the San Francisco Mts. of San Domingo. It was named "*Melanoconion indecorabilis* Theob." by Mr. Coquillett, but that was described from Para, Brazil, and we do not believe it is our species.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender.	5
5.	Air tube four times as long as wide or over.....	7
7.	Anal appendages four, normal.....	8

Digitized by Google

8. Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent. 18
18. Air tube without a crown of spikes, smooth throughout..... 19
19. Air tube with long, well-defined tufts..... 20
20. Body spicular-pilose 21
21. Five tufts on posterior margin of tube subequal in length, short; lateral abdominal hairs in twos on segments 3 to 5..... 22
22. Air tube 6 × 1; upper head hair multiple; pecten rather long
inhibitator

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX INHIBITATOR:

Female.—Proboscis moderate, swollen at tip, labellæ conically tapered; vestiture black with a slight bronzy reflection; setæ minute curved, black, those on the labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, slender, black, with a few outstanding setæ at base. Antennæ moderate; joints subequal, rugose, coarsely pilose, black, second joint not much longer than third; tori subspherical, with a cup-shaped apical excavation, yellowish, brown on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, convex, brown, nude. Eyes black. Occiput brown, clothed with broad appressed blackish scales and many erect, forked bronzy-brown ones, margins of eyes dull-white scaled, a patch of flat white scales low down on sides; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, with some brown bristles. Mesonotum luteous brown, clothed with narrow, curved, light bronzy-brown scales and rows of stout black bristles. Scutellum trilobate, with similar vestiture to mesonotum, each lobe with a group of black bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ pale luteous with a slight greenish tint, with rows of pale bristles.

Abdomen subcylindrical, truncate at tip, clothed dorsally with black scales with a coppery or blue reflection, a row of lateral, triangular segmental sordid whitish spots; venter dark scaled with whitish bands at bases of segments; long blackish setæ at posterior margins of segments above; tip of abdomen bristly.

Wings rather broad, hyaline; petiole of second marginal cell about one-fifth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant about twice its own length from anterior cross-vein; scales of veins rather dense, brown, with a blue reflection on costa, outstanding ones mostly narrowly ovate on second to fourth vein outwardly. Halteres whitish, with dark knobs.

Legs moderately long, slender; vestiture black with a slight bronzy reflection, femora whitish beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis straight, long, and slender, enlarged towards tip, black scaled. Palpi exceeding the proboscis by more than the length of the last joint, slender, nearly uniform, black, with black bristles on end of long joint and on last two joints; vestiture entirely of dark scales with a bronzy luster. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertion of hair-whorls; hairs long, brown, moderately dense. Wings slightly narrower than in the female, the stems of the fork-cell a little longer. Coloration similar to the female. Abdomen long, slender, subcylindrical, enlarged towards apex; lateral pale spots diffuse, not visible from above; lateral ciliation coarse and rather sparse. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 12, fig. 83): Side-pieces over twice as long as wide; tips conically tapered; a prominence rising somewhat beyond middle, divided into three branches, outer enlarged apically, bearing six filaments of different lengths,

Digitized by Google

others short, each bearing a filament expanded near apex and terminating in a sharp point. Clasp-filament rather large, contracted mesially, apex bent, with a row of hairs along outer aspect and with a small terminal claw. Harpes with a long, slender inner branch tipped by a row of teeth. Harpagones divided, one branch with terminal teeth. Basal appendages long with enlarged setose tips.

Larva, Stage IV (plate 106, fig. 355).—Head rounded, broad, eyes prominent, a large notch at insertion of antennæ, front margin arcuate, slightly excavate between clypeal spines. Antennæ large, slightly curved, a large tuft at outer third, apical portion slender; four long terminal setæ and a long digit; basal part of antenna spined on the outside. Upper pair of dorsal head-hairs small, multiple, lower pair long, single; ante-antennal tufts multiple. Mental plate triangular, with a stout central tooth and eight on each side, basal ones larger and more remote, except last which is small. Mandible quadrangular, very broad on outer margin, slightly pilose at base; three long filaments and a tuft of hairs before tip; an outer row of cilia; a row of small tufts from rounded prominences within outer margin; dentition of four teeth on a short process which lies in line with front margin, first and fourth equally long; two short teeth at base, two filaments and a row of seven short feathered hairs within; process below furcate, down-curved, with groups of hairs; basal angle pointed; a row of hairs within; a short row of basal hairs. Maxilla elongate, divided by a suture; inner half with rough irregularities on lower part of margin, a row of fine cilia within, a jointed filament near suture; a row of long hairs at tip running down the suture; outer half with two filaments below middle. Palpus very short, with four long slender digits in two pairs. Thorax rounded, wider than long; abdomen moderate; skin coarsely hairy but not densely so; lateral hairs in threes on first abdominal segment, in twos on second to fifth. Tracheal tubes narrow. Air-tube slender, over seven times as long as wide, slightly widened at base, outer half uniform; pecten of long spines reaching over one-third the length of tube, followed by five tufts in a line on posterior margin, the outer ones somewhat shorter; single spine of pecten serrate, with about nine equal branches. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at tip, terminating in a row of spinules. Anal segment nearly twice as long as wide, ringed by the plate; dorsal tuft two very long hairs and a small one on each side; ventral brush well developed, confined to the barred area. Anal gills small, not as long as the segment, rather bluntly tipped.

Mr. Busck obtained the larvæ in a slowly running, clear, cold spring.

Island of Santo Domingo, West Indies.

San Francisco Mountains, September 3, 1905 (A. Busck).

CULEX PILOSUS (Dyar & Knab).

Mochlostyrax pilosus **Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 223, 224, 1906.**

Original Description of Mochlostyrax pilosus:

The upper epistomal hair is double, the lower single, the anteantennal tuft of four. Air tube straight along the front side, curved behind, the pecten not reaching one-half, composed of long spines; eight hair tufts on the posterior edge, the two within the pecten very long, the others shorter. Comb of the eighth segment of 15 thorn-shaped scales in a curved row.

The specimens were collected by the junior author in Santa Lucrecia, Mexico, in cattle tracks filled with water in the edge of a swamp. They have the habit of lying on the back at the bottom. The adults were named "*Melanoconion atratus* Theob." by Mr. Coquillett.

The following is an abstract of the table:

1. Antennæ with the tuft from a notch beyond the middle..... 2
2. Air tube not over four times as long as wide, stout at base and tapering, slightly curved forward with two stout hooks at tip... 4
4. Bars of comb in a curved row; body pilose..... *pilosus*

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX PILOSUS:

Female.—Proboscis moderate, swollen at tip, labellæ conically tapered; vestiture black with a slight bronzy reflection; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, slender, black with a few outstanding setæ at base. Antennæ moderate, joints subequal, rugose, pilose, black, second joint not much longer than third; tori subspherical, with a cup-shaped apical excavation, yellowish, brown on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, convex, brown, nude. Eyes black. Occiput brown, clothed with broad, flat black scales and many erect, forked ones, margins of eyes white-scaled, a patch of flat white scales low down on sides; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, with some brown bristles. Mesonotum brown, clothed with narrow, curved bronzy-brown scales and rows of stout black bristles. Scutellum trilobate, with similar vestiture to mesonotum, each lobe with a group of brown bristles. Postnotum elliptical, prominent, luteous brown, nude. Pleuræ and coxæ pale brownish, with rows of pale bristles.

Abdomen subcylindrical, truncate at tip, clothed dorsally with black scales with a strong coppery or blue reflection, a row of lateral, basal, triangular, segmental whitish spots; venter blackish scaled, with broad white bands at bases of segments; posterior margins of segments with coarse brown hairs; tip of abdomen bristly.

Wings rather broad, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein distant about twice its own length from anterior cross-vein; scales of veins brown, outstanding ones mostly narrowly ovate on second to fourth veins outwardly, the other scales narrowly ligulate. Halteres whitish, with dark knobs.

Legs moderately long, slender; vestiture black with a bronzy and blue reflection, femora whitish beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2 mm.; wing 2 mm.

Male.—Proboscis straight, gradually enlarged towards tip, black scaled. Palpi exceeding the proboscis by more than the length of the last joint, slender, apical portion somewhat enlarged, black, with many black hairs on end of long joint and on last two joints; vestiture bronzy black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, longer than usual, very slender, whitish, with black rings at insertion of hair-whorls; hairs long, black, moderately dense. Coloration similar to the female. Abdomen subcylindrical, dorsally with bronzy and blue reflections, segments with basal leaden whitish bands joined to a row of lateral white spots; lateral ciliation long, coarse, brown. Wings narrower than in the female, the stems of the fork-cells longer; vestiture sparser. Claw formula, 1.0–1.0–0.0.

Length: Body about 2.5 mm.; wing 2 mm.

Genitalia (plate 12, fig. 80): Side-pieces over twice as long as wide, tips conically tapered; a prominence arising somewhat beyond middle, divided into three branches, outer forked at apex and bearing three filaments on each fork, innermost one long; the other two branches each with a single long filament expanded near apex and terminating in a sharp point. Clasp-filament long, thick, constricted at middle, tip rounded capitate, with a row of fine curved setæ on outer margin and a short articulated spine on inner semi-detached portion. Harpes forked at right angles, the inner branch long and slender, terminating in a row of teeth. Harpagones divided, both branches short, curved, smooth.

Larva, Stage IV (plate 112, fig. 379).—Head broad, transverse, widest through eyes, slightly convex on sides, a large notch at insertion of antennæ,

Digitized by Google

front margin obtusely arcuate. Antennæ long, slightly curved, thick and well spined on basal two-thirds with a large tuft from a notch; two long setæ before tip, a long seta, a short one and digit on a pedestal at tip. Upper pair of dorsal head-hairs double, lower pair single; ante-antennal tufts multiple. Mental plate small, triangular, with a large, stout basal tooth and five on each side, last one small and remote. Mandible quadrangular; three filaments and a tuft of hairs before tip; an outer row of cilia from a long collar; a row of transverse rounded prominences well within outer margin, each bearing a row of short hairs and a single long one; dentition of two teeth on a slight process with a row of stout spines below; a long, smooth filament and row of feathered hairs within; process below almost in line with outer margin, deeply but obscurely furcate, with a longitudinal row of hairs and tuft at tip of each limb; basal angle narrow and prominent, row of hairs within in line with, and approximate to basal hairs. Maxilla elongate, bluntly rounded at tip, divided by a suture; inner half with a row of spines on margin which are long beyond middle and at base, two short rows of cilia within; a row of long hairs at tip running down along suture; outer half with two filaments at basal third preceded by a group of fine hairs. Palpus very short, rather stout, with four long digits. Thorax rounded, wider than long. Abdomen moderate, the anterior segments shorter; lateral hairs in fives on first segment, in threes on second, in twos on third to sixth; subdorsal hairs stellate; tracheæ very narrow; skin pilose. Air-tube conically tapered, straight before and arcuate behind, three times as long as wide; pecten of long spines reaching to basal two-fifths; single spine sharply and deeply serrate on one side; eight long tufts on posterior margin, decreasing in length towards tip; an apical pair of recurved hooks. Lateral comb of eighth segment of about fifteen scales in a curved row; single scale thorn-shaped, with very obscure lateral spinules. Anal segment much longer than wide, ringed by the plate; dorsal tuft of two long hairs and a short one on each side; ventral brush well developed, confined to the barred area. Anal gills long, tapered to a blunt point.

The larvæ live in ground-pools. Mr. Knab got them in holes made by horse's feet in mud at the margin of a swampy area of a river. There were no habitations near. The larvæ lie on their backs on the bottom. Color light grayish; head slightly darker; tracheæ very narrow; gills very long and tapering to a point; head and thorax large and broad; mouth-tufts pale grayish.

Mexico.

Santa Lucrecia, State of Vera Cruz, June 21, 1905 (F. Knab).

CULEX CAUDELLI (Dyar & Knab).

Mochlostyrax caudelli Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 223, 224, 1906.

ORIGINAL DESCRIPTION OF MOCHLOSTYRAX CAUDELLI:

The upper epistomal tuft has three hairs, lower three, the small tuft below eight hairs, the anteantennal tuft five hairs. Air tube straight or slightly concave before, curved behind, with a pair of hooks at the tip. Pecten very long, not reaching half way along the tube; seven tufts on the posterior edge, the two within the pecten longest, the rest successively shorter; a single tuft on the side of the tube. Comb of sixteen bar-like spines in a straight row. Anal segment with complete chitinous ring, the gills very long, tapered. The body is without spicules.

Mr. Busck collected the specimens in a rather large pool in a palm swamp far from civilization at Arima, Trinidad. He says: "the larvæ are weakly looking small fellows, which lie on their backs with jaws upward and open. They feed on very minute animal life (Crustacean) which abounds in these pools; observed this habit both in nature and in captivity and bred so few (five specimens) because the rest died when the Crustaceans gave out."

The adults were named "*Melanoconion atratus* Theob." by Mr. Coquillett. We have [named] it for Mr. A. N. Caudell, our friend and co-worker.

Digitized by Google

The following is an abstract of the table:

1. Antennæ with the tuft from a notch beyond the middle..... 2
2. Air tube not over four times as long as wide, stout at base and tapering, slightly curved forward with two stout hooks at tip.... 4
4. Bars of comb in a straight row; body glabrous..... 5
5. Comb of sixteen bars..... *caudelli*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX CAUDELLI:

Female.—Proboscis rather long, slender, swollen at tip and clothed with deep brown scales. Palpi short, about one-fifth the length of the proboscis, rather stout, covered with coarse brown scales. Antennæ long and slender, joints subequal, rugose, coarsely pilose, black; tori subspherical, with a cup-shaped apical excavation, pale brownish, darker within; whorls consisting of sparse moderately long hairs, cilia coarse and long; second segment slightly longer than succeeding one. Clypeus prominent, shining deep brown. Occiput clothed with black, broad recumbent scales with a bronzy or leaden luster and with scattered brown, erect, forked scales, margins of eyes narrowly dull-white scaled, cheeks silvery white.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and black bristles. Mesonotum deep brown, clothed with narrow, curved bronzy-brown scales; setæ rather sparse, coarse and black. Scutellum with patches of brown scales, the median lobe very large and prominent, each lobe with a group of black bristles. Postnotum olive brown, with a small median carina, nude. Pleuræ and coxæ green, with flat whitish scales and rows of dark setæ.

Abdomen subcylindrical, depressed, truncate apically; dorsal vestiture of bronzy-brown scales, in some lights nearly black with bluish iridescence, the segments with basal triangular silvery-white spots at the sides; venter bronzy brown scaled on apical halves of segments, basal halves white; tip of abdomen with coarse bristles; cilia on hind margins of segments coarse but sparse.

Wings rather broad, vestiture of bronzy-brown scales, with a bluish reflection on costa, those on forks of second and fourth veins and outer portion of third dense, ovate, also on first vein; petiole of second marginal cell about one-fifth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein more than its own length from anterior cross-vein.

Legs shining bronzy brown, black in some lights; under surface of femora pale. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis moderately long, rather slender, swollen at tip, clothed with bronzy-brown scales. Palpi slender, very long; exceeding the proboscis by nearly the length of the last two joints, which with tip of long joint are slightly swollen and clothed with long black hairs; vestiture bronzy brown. Antennæ densely plumose, hairs of whorls very long. Abdomen long and slender, posterior portion depressed and moderately broad; vestiture above bronzy brown, bases of segments with rather broad basal bands of silvery-white scales; seventh segment without basal band but with lateral silver white spots occupying about half of basal portion of margin; ventral surface bronzy brown with pale basal bands; lateral cilia dark, moderately coarse and long. Coloration otherwise similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, scales of veins sparser. Claw formula, 1.0–1.0–0.0.

Length: Body about 2.5 mm.; wing 2 mm.

Genitalia (plate 11, fig. 74): Side-pieces over twice as long as wide, tips conically tapered, projection extending from before middle to near tip, divided into three portions, outer bearing three rods, a leaf-like appendage and a seta, others bearing each a long filament with tapered recurved tip. Clasp-filament stout, slightly enlarged at base, tip expanded into the shape of a foot, setose on outer

Digitized by Google

margin, and with an articulated terminal spine. Harpes with a short, thick inner branch crowned with spines. Harpagones divided into several lamellæ. Basal appendages approximate at origin, divergent, long, rounded enlarged apically, with many long setæ.

Larva, Stage IV (plate 112, fig. 378).—Head transverse, widest through eyes, convex at sides, a deep notch at insertion of antennæ, front margin broadly rounded, with a slight emargination between the short clypeal spines. Antennæ large, slightly curved, basal two-thirds thick and well spined, with a large tuft from a notch; two long setæ shortly subapical, a moderate seta, a short one and a digit at tip. Both pairs of dorsal head-tufts short, in threes; ante-antennal tufts multiple. Mental plate triangular, with a large central tooth and seven on each side, last ones more remote, basal ones small. Mandible quadrangular; three filaments before tip; an outer row of cilia from a collar; a row of transverse rounded prominences well within outer margin, each bearing a row of short hairs and a tuft of long ones; dentition of two teeth with a group of spines below; a spine before, a long, smooth filament and row of feathered hairs within; process below obscurely furcate, with a longitudinal row of hairs and a tuft at tip; basal angle sharp and slender, with a row of hairs within from stout bases; a row of long hairs at base. Maxilla elongate, slender, divided by a suture; inner half with a row of long spines on a margin beyond middle and at base; an irregular row of spines within, a few at base; a long articulated spine before tip; a row of long hairs at tip running down along the suture; outer half with the two filaments very near the base and a group of stout spines before. Palpus rudimentary with four long digits irregularly distributed. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter; skin glabrous. Air-tube slightly curved forward, curved on posterior aspect, four times as long as wide; pecten long, reaching over basal two-fifths; single tooth long, serrate on one side, base narrowly expanded and with serrations over it; nine long tufts on posterior margin, three of them within pecten; a pair of long curved hooks, with median branch, at tip. Lateral comb of eighth segment of about sixteen large bar-like spines in a straight row; single spine sharply tapered, fringed with very fine nearly invisible spinules. Anal segment longer than broad, ringed by the plate; dorsal tuft of two long hairs and a short one on each side; ventral brush well developed, confined to barred area. Anal gills very long, tapered to a sharp point.

The larvæ live in ground-pools. Mr. Busck got them in a large open pool in high woods.

Island of Trinidad, West Indies.

Arima, July 10, 1905 (A. Busck); Trinidad (F. W. Urich).

CULEX LEPRINCEI Dyar & Knab.

Culex leprincei Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 202, 1907.
Culex leprincei Busck, Smiths. Misc. Colls., quart. iss., lii, 67, 1908.
Culex leprincei Theobald, Mon. Culic., v, 614, 1910.

ORIGINAL DESCRIPTION OF CULEX LEPRINCEI:

♀.—Proboscis moderately long and slender, enlarged towards the apex, entirely black scaled; palpi short, black scaled; occiput clothed with flat bronzy scales and with black erect forked ones, without white ocular margin; mesonotum clothed with deep bronzy brown scales with faint indications of two lighter longitudinal dorsal lines; scutellum bronzy scaled; metanotum deep pitchy brown; abdomen broad, flattened, truncate at tip, black scaled above with faint bronzy luster, the bases of the segments with lateral white triangular spots, the marginal hairs light yellow, beneath the segments are black with broad white basal bands; legs dark with bronzy luster, the knees and tips of tibiae lighter colored, tarsi not ringed, claws simple; wing scales brown. Length, 3.5 mm.

Digitized by Google

♂.—Palpi about one-fourth longer than the proboscis, the two last segments very hairy, clothed entirely with deep brown scales with bronzy luster; antennæ densely plumose; lateral spots of the abdomen large on segments 5, 6 and 7, the lateral cilia coarse, moderately abundant with yellowish luster. Length, 3 mm.

Sixteen specimens, Tabernilla and Pedro Miguel, Canal Zone, Panama (August Busck, collector), bred from larvæ in a stagnant ill-smelling pool and among grass in the edge of a slowly running stream.

***Type.*—No. 10869, U. S. National Museum.**

Named, at the suggestion of Mr. Busck, in honor of Dr. J. A. Le Prince, Chief Sanitary Inspector of the Canal Zone.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX LEPRINCEI:

Female.—Proboscis moderate, swollen towards tip, vestiture black with a bronzy reflection; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi small, about one-fifth as long as proboscis, black scaled. Antennæ moderate, joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, dark brown with a white pruinosity. Eyes black. Occiput black, with some narrow, curved bronzy-brown scales dorsally, sides with flat, broad scales, dull whitish below, numerous forked, black scales dorsally; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, black with a few narrow whitish scales and black bristles. Mesonotum black, clothed with dark bronzy-brown, narrow, curved scales, four indistinct lines of scales of a more golden color, a closely approximated dorsal pair and a subdorsal one, the latter not reaching anterior margin of disk, and a line along margin of disk widened into a patch before the root of the wing; bristles rather long, dark brown. Scutellum trilobate, with a few small, narrow brown scales with a brassy luster, each lobe with a group of black bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ brownish black, coxæ dark brown, with patches of narrow, elliptical, white scales and rows of pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black with a slight bronzy reflection, a row of lateral, basal segmental, triangular white spots; venter black, segments broadly banded with white at bases; bristles on apical margins of segments pale.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins rather dense, particularly on apical portion, broadly linear to narrowly elliptical, brown with a blue reflection on costa, the elliptical scales being on second to fourth veins outwardly. Halteres with whitish stems and knobs.

Legs moderate, vestiture black with a bronzy and bluish reflection, femora whitish beneath nearly to apex, tips white above, tarsi with a stronger bronzy reflection. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis straight, gradually enlarged towards apex, black scaled. Palpi exceeding the proboscis by the length of the last joint, slender, apical portion enlarged, end of long joint and last two joints with numerous long black hairs; vestiture entirely of bronzy-black scales. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertions of hair-whorls; hairs long, dense, black. Coloration similar to the female. Wings scarcely narrower than in the female, venation and scaling nearly the same. Abdomen elongate, depressed, slightly broadened towards apex, lateral spots larger than in the female, sixth and seventh segments with distinct white basal bands, expanded at the sides; lateral ciliation coarse and moderately abundant on apical half, dark, with brassy luster. Claw formula, 1.1–1.1–0.0.

Digitized by Google

Length: Body about 3.5 mm.; wing 2.8 mm.

Genitalia (plate 12, fig. 84): Side-pieces over twice as long as wide, rather stout, tips conical; inner process situated near middle, divided into two slender arms, the outer bearing a leaf-like appendage with round tip and a cluster of rods, the inner shorter, forked, each limb with a long filament with spatulate tip; clasp-filament constricted in middle, with two terminal claws, two minute spines before tip. Harpes with inner arm long, very slender, its tip bent at right angles and bearing a comb-like row of teeth. Harpagones plate-like, divided into lamellæ, their tips forming projecting angles. Basal appendages elliptical, oblique, setose.

Larva, Stage IV (plate 106, fig. 353).—Head rounded, somewhat wider than long, widest through eyes. Antennæ long, rather stout, a tuft at the outer third, the part beyond slender, the shaft spinulate towards the base. Upper pair of dorsal head-hairs small, multiple, lower pair long, single; ante-antennal tuft long, multiple. Body with the skin very pilose; lateral abdominal hairs in threes or fives on third segment, threes or fours on fourth, twos on fifth and twos or threes on sixth. Lateral comb of eighth segment of rather large scales in an irregular double row or slightly triplicate in middle. Air-tube six times as long as wide, straight, gradually tapering to tip; terminal hooks slender; pecten rather long, reaching basal third, followed by five tufts in a line, which are progressively shorter towards tip; two minute tufts towards dorsal aspect. Anal segment longer than wide, ringed by the plate, becoming spinose behind; dorsal tuft of two long hairs and a short one on each side; ventral brush well developed, confined by the chitinous ring. Anal gills shorter than the segment, tapered, equal.

The larvæ live in ground-pools. Mr. Busck got them along the edges of a slowly running stream among grass and in a large, stagnant, illy smelling pool. Panama.

Pedro Miguel, Canal Zone, April 24, 1907 (A. Busck); Tabernilla, Canal Zone, April 26, 1907 (A. Busck).

Mr. Busck obtained the larvæ in April, but not at any other time. We therefore consider the species to be of seasonal occurrence.

CULEX REDUCTOR Dyar & Knab.

Mochlostyrax jamaicensis Grabham (not *Culex jamaicensis* Theobald), Can. Ent., xxxviii, 318, 1906.
Mochlostyrax jamaicensis Dyar & Knab, Proc. Biol. Soc. Wash., xix, 172, 1906.
Culex reductor Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 257, 1909.
Mochlostyrax jamaicensis Theobald, Mon. Culic., v, 619, 1910.

ORIGINAL DESCRIPTION OF MOCHLOSTYRAX JAMAICENSIS:

♀. Head with pale yellow flattened scales at the middle and sides, many long black forked scales at the back, each of these irregularly frayed along the upper expanded border. Some long black hairs among the other scales. Proboscis black, swollen at the apex, speckled with yellow scales, tip yellow. Palpi black, the terminal joints yellow scaled. Eyes with white borders posteriorly. Clypeus dark brown. Antenna dark brown, joints with scattered brown hairs, these are rather larger and arranged in a ring below each clear area, suggesting a double set of verticellate hairs. Prothoracic lobes black, somewhat prominent, covered with fine scales and long black hairs. Mesothorax black, with two dark brown median bands anteriorly. Surface covered with fine hair-like scales, a row of long black hairs on each side of the mid line, another row at the edge near the prothoracic lobes, and a group in front of the insertion of the wing. Scutellum dark brown, with fine scales, six long bristles on the posterior border of the mid lobe, and four on each of the lateral lobes. Metanotum dark brown. Pleura grayish, with a line of black bristles down each side to the mid coxae, a cluster of bristles anteriorly between the front coxae, several small patches of white hairs below the insertions of the wings. Abdomen black, and speckled with dull white scales, the latter denser at the bases of the segments, forming a pronounced band at the base of the second segment, long white

Digitized by Google

hairs along the posterior borders of the segments. Small lateral white scaled areas on the sixth and seventh segments formed by the extensions of the white ventral bands. Venter with broad crescentic basal bands of silvery scales. Legs black, ventral surfaces of the femora white, except at the extreme apices, where there are patches of black bristles; apices of femora and tibiae swollen. A band of lighter scales running along the under surfaces of all the legs (especially marked on the mid legs) to the tips. A yellow spot at the apex of hind tibiae. Knee spots not defined. Ungues equal and simple. Wings, the apical portions of the first four long veins densely scaled with broad fan-shaped scales. The two median rows of broad scales are represented by narrow elongated ones on the bases of the second and third, first part of the base of the fourth and upper arm of the fifth. The remainder of the base of the fourth and the lower arm of the fifth have long scales on one side only. The base of the fifth has broad scales only throughout its length. On the sixth long vein the scales are all slender and elongated. First submarginal cell as wide as but much longer than the second posterior, about four times as long as the stem; second posterior with the stem about half length of the cell. Posterior cross vein about twice its own length distant from the mid cross vein. Halteres with pale stems and knobs, the latter mottled with dark areas. Length, 2.5 mm.

♂.—Palpi black, copiously speckled with yellowish scales, slender, larger than the proboscis, the tip of the latter reaching to the middle of the penultimate joint; long hairs along the sides and under surfaces of the first two joints and apex of the antepenultimate joint. Both terminal joints and apex of antepenultimate joint slightly swollen. Abdomen black, with scattered dull white scales; these form an ill-defined band down the centre of the abdomen, lateral patches of silvery scales on the fifth, sixth and seventh segments. Legs black, conspicuous lines of lighter scales on the under surfaces of all the legs. Ungues of the fore and mid tarsi unequal and uniserrate; larger with one long median blunt tooth, smaller with a small basal tooth. Ungues of the hind tarsus equal and simple. Length, 2.5 mm.

The following points were noted in the adult LARVA: Fully grown larva about ⅛ inch long, with relatively large head and thorax. Antennae large and prominent, larger than the head, slightly curved in lower third, somewhat swollen in the basal half, only moderately infuscated, rather more so above the lateral tuft and at the extreme base. Tuft a little above the middle, of about twelve fine flattened hairs measuring about three-quarters length of the antennal shaft. Apex with four large deeply infuscated spines, the two longest about half the length of shaft. Surface covered with many fine chitinous spines, especially along the outer aspect. Mentum small, with about fifteen teeth, apical tooth prominent. Upper epistomal hair double or single, lower larger, single, both flattened, neither reaching to the anterior border of head. Anteantennal hair with five or six divisions, flattened. Thorax coarsely pilose along the anterior and lateral aspects. Abdomen finely pilose, more densely at the insertion of the lateral hairs and near the comb. Lateral hairs long, five on each side of the first segment, three on the second, paired on the hinder segments. Comb of 10–12 well-separated bars in a curved row, upper ones smaller, smallest about one-third length of longest. Each scale has a line of fine hairs on each side, most marked on the swollen basal portion. Air tube subconical, with a slight curve forward, about five times as long as broad (at the base). A pair of hooks at the tip, each with a fine curved tooth at the middle. Eight or nine pairs of long hairs along the posterior surface, each with 4–5 divisions; upper shorter, two pairs within the lines of insertion of the pecten teeth. Lines of pecten teeth insertions reach up one-quarter of the tube; teeth about nine pairs, upper very long, tips of the highest approach the middle of the tube, each tooth narrow, flattened, slightly curved, with many fine setæ along its inner border. Two pairs of small compound hairs on each side of the tube, one near the middle, the other within the upper quarter. Band ringing the anal segment about as long as broad. Ventral group of hairs spring from a separate barred area. Dorsal group of two pairs of very long simple, nearly equal, hairs. Anal gills with prominent tracheae, elongated, narrow, unequal, lower pair longest, half as long again as the ventral hair group. Pupa with rather long, deeply-infuscated siphons.

Observations.—The larvæ of this species, belonging to Dyar and Knab's interesting new genus, *Mochlostyrax*, were collected in the same locality as the preceding. They were placed in a separate jar, with an abundance of Crustacea and Infusoria, and developed rapidly. The usual position of the larva was on its back at the bottom of the jar or hooked up on the sides by its siphon. It apparently never rose to the surface except just before pupating. The adults bear a strong superficial resemblance to the small swamp mosquito, *Melanoconion atratus* Theo., the venation and form of the wing scales being precisely similar. The description of the adults was drawn up from freshly-killed specimens.

Digitized by Google

ORIGINAL DESCRIPTION OF CULEX REDUCTOR:

We propose this name to replace *Mochlostyrax jamaicensis* Grabham, since when *Mochlostyrax* is placed as a synonym of *Culex*, as we find necessary, Dr. Grabham's name becomes preoccupied by *Culex jamaicensis* Theobald. Theobald's species was later placed by him in the genus *Grabhamia*, and by us in *Aëdes*, but the name *Culex jamaicensis* can not again be used.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX REDUCTOR:

Female.—Proboscis moderate, swollen at tip, labellæ conically tapered; vestiture black with a bronzy reflection; setæ minute, curved and black, those on the labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, black, with a few outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, blackish, second joint a little longer than third; tori subspherical, with a cup-shaped apical excavation, luteous, shading to brown within; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, convex, brown, nude. Eyes black. Occiput blackish, clothed with broad, flat black scales with a pale gray reflection in some lights; some scales along ocular margin gray; a patch of dull white scales well down the side; many erect, forked black scales dorsally; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and brown bristles. Mesonotum brown, clothed with narrow, curved, dark bronzy-brown scales and rows of dark brown bristles. Scutellum trilobate, with similar vestiture to mesonotum, with a group of black bristles on each lobe. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ luteous shaded with brownish, with patches of elliptical white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black with a bronzy and blue reflection, a row of lateral, triangular, basal segmental, whitish patches; venter blackish scaled, a broad whitish band at base of each segment; posterior margins of segments with rather coarse pale hairs; apex of abdomen, particularly beneath, densely hairy.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant twice its length from anterior cross-vein; scales of veins brown, with a blue reflection along costa, most of outstanding ones ovate on second to fourth veins outwardly. Halteres whitish, with blackish knobs.

Legs moderate; vestiture black with a blue and bronzy reflection on tibiæ and tarsi; femora whitish beneath except at tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis long, straight, slender, gradually enlarged towards apex, black scaled. Palpi exceeding the proboscis by nearly the length of the last two joints, which, with end of long joint, are slightly enlarged and moderately hairy; vestiture entirely brownish black. Antennæ plumose; last two joints long and slender, rugose, pilose, black; the others short, whitish, with black rings at insertions of hair-whorls; hairs of whorls long, brown. Coloration similar to the female. Abdomen elongate, subcylindrical, expanded apically; lateral spots visible dorsally on fourth to seventh segments, eighth segment white dorsally; lateral ciliation coarse and dense, brown, but not forming a distinct lateral fringe. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 11, fig. 77): Side-pieces over twice as long as wide, tips conically tapered, median prominence divided into two portions, outer one bearing seven rods which are separated partially into three groups, the inner one furcate and bearing a filament on each fork, tips of filaments expanded and pointed. Clasp-filament enlarged at base, slender in middle, tip partially divided, swollen,

Digitized by Google

outer rounded and serrate along margins, the inner elliptical, serrate on outer margin, serration terminating in a large tooth at tip close to the articulated terminal spine. Harpes with a long, slender inner branch which is bent at tip and bears a row of teeth. Harpagones divided into a number of plates.

Larva, Stage IV (plate 113, fig. 382).—Head transverse, much broader than long, subquadrate, strongly convex at the eyes. Antennæ long, rather stout, a tuft at outer third, part beyond slender. Upper pair of dorsal head-hairs double, short, lower pair single, long; ante-antennal tufts multiple. Body with skin glabrous; lateral hairs in threes on third to sixth abdominal segments. Comb of eighth segment of about twelve spines in a single, curved row, lowermost spines a little dislocated. Air-tube scarcely three times as long as wide, tapering outwardly, slightly curved forward on apical portion; terminal hooks large, with median tooth; eight tufts of long hairs along posterior margin, reaching from near base to apex, double at base, multiple at apex; pecten of long teeth, reaching beyond basal third of tube. Anal segment longer than wide, ringed by the plate; dorsal tuft of three unequal hairs on each side; ventral brush well developed, confined by the chitinous ring. Anal gills large, stout, tapering to rounded tips, equal.

The larvæ live in temporary pools, according to Dr. Grabham's note. He says: "The usual position of the larva was on its back at the bottom of the jar or hooked up on the sides by its siphon. It apparently never rose to the surface except just before pupating."

Island of Jamaica, West Indies.

Kingston (M. Grabham).

CULEX FLORIDANUS (Dyar & Knab).

Mochlostyrax floridanus **Dyar & Knab, Proc. Biol. Soc. Wash., xix, 171, 1906.**

ORIGINAL DESCRIPTION OF MOCHLOSTYRAX FLORIDANUS:

The larva falls in the table (Journ. N. Y. Ent. Soc., xiv, 223, 1906), with *pilosus* D. & K., but the body is glabrous. Head broad and squarely transverse, eyes bulging, a large notch at insertion of antennae; clypeus shallowly emarginate with two spines; antennae long, a small notch at outer third bearing the long hair tuft; the two longest of the apical spines placed before apex. Both head hairs single, small, a third hair below, anteantennal tuft large, multiple. Lateral abdominal hairs in twos on the third to sixth segments. Comb of the eighth segment of 12 scales in a strongly curved, single, rather irregular row. Air tube three and a half times as long as wide, roundedly tapered on the posterior side, with a pair of hooks at tip; eight long tufts on the posterior margin in a straight row, two of them within the pecten; two small lateral tufts. Tufts behind the comb large. Anal segment longer than wide, ringed; ventral brush moderate, dorsal tuft few haired. Anal gills rather long, the upper pair considerably shorter than the lower ones.

Larvæ from Estero, Florida (J. B. VanDuzee); no adults.

***Type.*—Cat. No. 10,025, U. S. Nat. Mus.**

This may be a synonym of *M. jamaicensis* Grabham (Can. Ent., xxxviii, 318, 1906). Dr. Grabham has kindly sent us larvæ and they agree very closely with our *floridanus*. We consider them conspecific. However, Dr. Grabham gives several differential points in his description, and, as whole larvæ are sent us, not isolations, there is a chance that a mixture of species occurred.

DESCRIPTION OF FEMALE AND LARVA OF CULEX FLORIDANUS (MALE UNKNOWN):

Female.—Proboscis moderate, swollen at tip, labellæ conically tapered; vestiture black with a bronzy reflection; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, black, with a few outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, blackish, second joint a little longer than third; tori subspherical, with a cup-shaped apical excavation, luteous, shading to brown within; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, convex, brown, nude. Eyes black. Occiput blackish, clothed with broad, flat, black scales with a

Digitized by Google

pale gray reflection in some lights; some scales along ocular margin gray; a patch of dull white scales well down the sides; many erect, forked black scales dorsally; a row of bristles along margin of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow pale scales and brown bristles. Mesonotum brown, clothed with narrow, curved dark bronzy-brown scales and rows of dark brown bristles. Scutellum trilobate, with similar vestiture to mesonotum, with a tuft of black bristles on each lobe. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ luteous shaded with brownish, with patches of elliptical white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black with a bronzy and blue reflection, a row of lateral, triangular, basal, segmental, whitish patches; venter blackish scaled, a broad whitish band at base of each segment; apices of segments with rather coarse pale hairs; apex of abdomen, particularly beneath, densely hairy.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant twice its length from anterior cross-vein; scales of veins brown, with a blue reflection along costa, dense, long, tips touching on contiguous veins, most of the outstanding ones outwardly on second to fourth veins and the upper branch of fifth narrowly ovate. Halteres whitish, with blackish knobs.

Legs moderate; vestiture black, with a blue and bronzy reflection on tibiæ and tarsi; femora whitish beneath except at tip. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Larva, Stage IV (plate 112, fig. 380).—Head transverse, much broader than long, subquadrate, strongly convex at the eyes. Antennæ long, rather slender, a tuft at outer third, the part beyond slender. Upper pair of dorsal head-hairs double, slight, lower pair single; ante-antennal tufts multiple. Body with skin glabrous; lateral abdominal hairs in twos on third to sixth segments; tracheæ very narrow. Lateral comb of eighth segment of about eight spines in a single, curved row, lowermost spines very slightly dislocated. Air-tube over three times as long as wide, tapering outwardly, slightly curved forward, terminal hooks large and toothed; nine very long tufts along posterior margin, progressively shortening towards apex of tube, the basal one beyond middle of pecten, all three to five haired; pecten reaching over one-third of tube, the teeth long. Anal segment longer than wide, ringed by the plate; dorsal tuft of two long hairs and a short one on each side; ventral brush well developed, confined by the chitinous ring. Anal gills moderate, lower pair considerably longer than upper ones.

The larvæ live in ground-pools with algæ. Mr. Van Duzee says:

"They were found on top of algæ at the side-wall of the inside of a large stone tank in which there were fish. I could find quite a number along the side, but did not find them on the algæ towards the middle of the tank."

Southern Florida.

Estero, July, 1906 (J. B. Van Duzee).

CULEX MICROSQUAMOSUS Grabham.

Culex microsquamosus Grabham, Can. Ent., xxxvii, 407, 1905.
Culex microsquammosus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 219, 1906.

ORIGINAL DESCRIPTION OF CULEX MICROSQUAMOSUS:

Adult larva. Collected in algæ-covered pools at the Rio Cobre Canal Dam, near Spanish Town, Jamaica, January 17th, 1905. Mentum a wide angle of many teeth, one of the outer teeth on each side rising considerably above the others. Antennæ stout and relatively large, lateral tuft of many feathered hairs. Apical hairs simple, 2 long, 2 short, a wedge-shaped lamella at apex.

Digitized by Google

Siphon many times longer than broad, in adult larvæ as long as the thorax and abdomen, slightly curved forward in its upper half; row of pecten in lower third of 15–18 scales, each scale a flattened lamella with 5–6 terminal serratures and 2–3 basal ones. Four bifid hairs along posterior margin of tube increasing in size from above downwards. Comb of 30–40 delicate scales in a rough triangle, each scale bordered with fine hairs along the free margin. Anal papillæ ovate, nearly as long as ventral hair tuft. Chitinous collar of ninth segment complete, broad. *Eggs* laid in rafts.

Mosquitoes bred from these larvæ were forwarded to Mr. Theobald, who has kindly sent me the following description:

"*Culex microsquamosus*, n. sp.—Thorax clear bright brown, unadorned, pleura pale gray. Proboscis indistinctly pale-banded in the middle. Abdomen deep blackish, with basal pale bands. Legs deep brown, unbanded; base and venter of femora gray; apex of hind tibiæ pale. Palpi of male acuminate, last two segments hairy, jet black, remainder mostly ochraceous brown. Male genitalia with three flattened spines and one foliate plate on the inner lateral process.

"♀.—Head deep brown, with narrow curved pale grayish scales and black and deep ochraceous upright forked ones, some small gray flat scales laterally. Clypeus brown. Proboscis black, showing a pale, indistinct median area in some lights. Palpi short, black-scaled, testaceous in the middle owing to a bare area. Antennæ deep brown. Thorax clear brown, scantily clothed with very small narrow curved pale bronzy scales (in some lights the metanotum is deeper brown); scutellum paler, gray in some lights, with small narrow curved bronzy-brown scales and rather long deep-brown border bristles, eight to the mid-lobe; metanotum ochraceous-brown to brown; pleura pale shiny gray, with some rows of small black bristles.

"Abdomen deep blackish brown, with basal pale bands to the third, fourth, fifth and sixth segments, traces on the seventh, pronounced on the eighth; the first segment is nude, shiny, testaceous, with brown hairs and two small median patches of black scales, border bristles pale ochraceous.

"Legs deep brown, unbanded; base and venter of femora gray, also to some extent the venter of the tibiæ and some pale scales beneath the tarsi. Apex of hind tibiæ with a pale spot, femoral and tibial hairs pallid; ungues small, equal, simple, much curved. Hind tibiæ and metatarsi about equal. Wings with typical Culex scales; first submarginal cell considerably longer and a little narrower than the second posterior cell, its base near the base of the wing, its stem one-third of the length of the cell; second posterior cell small, its stem about two-thirds the length of the cell; lower branch of the fork much curved; posterior cross-vein rather longer than the mid, not quite its own length distant from it; median vein-scales on the third rather large and dusky. Halteres with white stem and fuscous knob, sharply contracted. Length 4 mm.

"♂ similar to ♀. Palpi with acuminate apical segment, the last two and apex of the antepenultimate segment black, with black hair tufts, remainder of palpi brown. Proboscis deep brown, with an indistinct broad median pale band. Fork cells small, the first submarginal longer and narrower than the second posterior cell, its base nearer the base of the wing; the stem about two-thirds the length of the cell; stem of the second posterior nearly as long as the cell. Ungues of the fore and mid legs unequal, uniserrated; hind equal and simple. Genitalia with sickle-shaped claspers, internal prominence with three thick flat spines, the mid broadest, the smallest not hooked at the apex, foliate plate acute apically, with a prominent curved spine over its base. Length 4 mm.

"*Observations.*—It comes very near *C. fatigans* and its allies, but the male genitalia differ, and the small thoracic scales at once separate it. The form of the first fork-cell varies. A very marked *variety* occurs, in which the abdominal banding is almost absent. This variety shows a few pale scales on the apical borders of some of the segments, and the posterior border-bristles on the mid-lobe of the scutellum are seven in number. The characters are not sufficient to separate it as a distinct species, and the male sent with it exactly resembles that of the type. Another specimen differs from the type in the rather more elongate form of the wing, but resembles it in all other features, and cannot be separated."

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX MICROSQUAMOSUS:

Female.—Proboscis moderate, enlarged apically, labellæ conically tapered; vestiture black, broadly whitish scaled beneath in middle; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, black, one-fifth as long as the proboscis, with a few outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, black, second joint not longer than

Digitized by Google

third; tori subspherical, with a cup-shaped apical excavation, brown; hairs of whorls moderate, sparse, black. Clypeus rounded, convex, brown, nude. Eyes black. Occiput brown, clothed with narrow, curved pale-brown scales on vertex, laterally intermixed with dark ones, some white ones along ocular margins, flat white ones well down the sides; many erect, forked black scales dorsally, forming a dense patch on each side; a row of black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, brown, with a few pale scales and black bristles. Mesonotum brown, with two impressed bare lines, clothed with small, short, narrow, curved bronzy brown scales, intermixed with larger black ones. Scutellum trilobate, luteous, with small bronzy scales, a few hair-like black scales on the mid lobe, each lobe with a group of black bristles. Postnotum elliptical, prominent, luteous, nude. Pleuræ and coxæ pale greenish, with small patches of flat white scales and rows of brown bristles.

Abdomen subcylindrical, truncate at tip; dorsal vestiture black, a row of pale bristles at posterior margins of segments, a row of lateral, basal, segmental, triangular, white patches, which on fifth, sixth, and seventh segments extend more or less onto the dorsum, tending to form transverse bands; eighth segment pale scaled with a dark apical spot; venter whitish scaled.

Wings moderate, hyaline; petiole of second marginal cell nearly half as long as its cell, that of second posterior cell as long as its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales of veins brown, black on costa, outstanding ones near tip of wing, long, linear, denser on forks of second, third and fourth veins. Halteres whitish, with a dark knob.

Legs moderate, black scaled with a bronzy and bluish reflection; femora whitish beneath to tips; tibiæ with a pale-bronzy shade beneath, the tips whitish. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 4 mm.

Male.—Proboscis straight, apical two-thirds thickened, vestiture blackish, paler beneath, with a lighter shade in the middle. Palpi exceeding the proboscis by nearly the length of the last two joints, which, with end of long joint, are thickened and densely hairy; vestiture black, a narrow pale whitish ring at basal third of long joint. Antennæ plumose, the last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls; hairs long, dense, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cell longer; vestiture sparse. Abdomen long, slender basally, expanded towards apex; dorsum with basal, segmental dull white bands, laterally expanded on the seventh segment, the eighth with white lateral triangular spots; lateral ciliation rather abundant, of coarse brown hairs. Claw formula, 1.1–1.1–0.0.

Length: Body about 4 mm.; wing 3.5 mm.

Genitalia (plate 16, fig. 116): Side-pieces twice as long as wide, conically tapered at tip, a quadrate prominence beyond the middle bearing three rods with hooked tips, a leaf-like appendage and a seta. Clasp-filament moderate, uniform with an articulated terminal spine. Harpes with an inner ligulate arm bearing a tuft of spines at tip, outer branch smooth, curved. Harpagones divided into plates strongly dentate on inner side. Basal appendages remote, setose.

Larva, Stage IV (plate 100, fig. 330).—Head broad, rounded, widest through eyes. Antennæ long, rather slender, a large tuft at outer third, the part beyond it slender, shaft spinose. Both pairs of dorsal head-hairs in threes, the anteantennal tuft multiple. Body with the skin glabrous; lateral abdominal hairs in twos on third to sixth segments. Lateral comb of eighth segment of many spines in a large triangular patch. Air-tube straight, tapering very gradually, about eight times as long as wide, pecten of short teeth and along basal fourth; four tufts well beyond pecten, subapical one removed laterad out of line,

Digitized by Google

three of them two-haired, the apical one three-haired. Anal segment longer than wide, ringed by plate; dorsal tuft of four unequal hairs on each side; lateral hair single, short; ventral brush ample, confined by the chitinous ring. Anal gills short, stout, pointed, lower pair shorter than upper ones.

The larvæ live in ground-pools more or less covered with algæ, according to Dr. Grabham's observations.

Island of Jamaica, West Indies.

Spanish Town, January 17, 1905 (M. Grabham).

Dr. Grabham attributes the authorship of the species to Mr. Theobald, but we are obliged to credit it to Dr. Grabham, since he not only published the article in which the description appears, but also prefaces Theobald's quoted description with one of his own of the larva, thereby fixing the species as his own. This species is nearly allied to *Culex salinarius* of continental North America, and is obviously the Jamaican representative of it.

CULEX INFLICTUS Theobald.

Culex inflictus Theobald, Mon. Culic., ii, 115, 1901.
Culex inflictus Giles, Gnats or Mosq., 2 ed., 462, 1902.
Culex inflictus Blanchard, Les Moustiques, 337, 1905.
Culex inflictus Theobald, Mon. Culic., v, 360, 1910.

ORIGINAL DESCRIPTION OF CULEX INFLICTUS:

Thorax brown in front, pallid behind, small pale brown curved scales on anterior part and three double rows of black bristles in front, two behind; pleuræ pallid. Abdomen dusky-black, with basal white triangular spots; venter grey. Legs black, unbanded, base and venter of femora grey, knee and tibial spots orange; fork-cells of wings short.

♀. Head brown, with pale curved scales and black upright forked ones, and a border of white curved scales round the eyes; antennæ brown, with pale bands, basal joint large and testaceous, dark on the inside; palpi black scaled, testaceous at the base; clypeus chestnut-brown; proboscis dark brown scaled, short, a little longer than the antennæ; eyes deep purplish-black.

Thorax with the mesothorax brown in front, pallid behind, the front with small pale brown curved scales, with three double rows of black bristles in front, two rows behind, one on each side of the pale area in front of the scutellum, which has small narrow pale scales and small dark bristles, long black bristles on each side over the roots of the wings; scutellum very pale silvery-grey, with small pale curved scales, seven dark brown bristles to median lobe, and five large ones to the lateral lobes; pleurae pale silvery-grey.

Abdomen covered with dusky-black scales, the segments with basal white triangular spots, and the posterior borders with long pale bristles; venter with grey scales.

Legs covered with deep black scales with purplish reflections, coxae grey, base and under-sides of the femora white scaled; knee spot and extreme apex of tibiae orange; ungues very small, equal, simple.

Wings with fork-cell short, the first sub-marginal cell longer but no narrower than the second posterior, two and a half times the length of the stem, its base nearer the base of the wing than the base of the second posterior; stem of the second posterior cell a little shorter than the cell; posterior cross-vein nearly four times its own length from mid cross-vein.

Halteres with pale ochraceous stem and fuscous knob.

Length.—4 mm. (hind legs 9 mm.).

Time of capture.—March.

Habitat.—Grenada (W. E. Broadway).

Observations.—Very distinct species, easily told by the pallid posterior portion to the thorax, with the strongly contrasted black bristles in two rows, one on each side of the pale space in front of the scutellum, with its small dark bristles and pallid scales. The legs look long and thin.

There are no specimens of this species in the collection of the U. S. National Museum.

The larva is unknown and the life history and habits are unknown.

Mr. F. W. Edwards tells us that he considers this species to be the same as *Culex scholasticus;* we have no personal knowledge of either form.

Digitized by Google

CULEX SCHOLASTICUS Theobald.

Culex scholasticus Theobald, Mon. Culic., ii, 120, 1901.
Culex scholasticus Giles, Gnats or Mosq., 2 ed., 459, 1902.
Culex scholasticus Blanchard, Les Moustiques, 336, 1905.
Culex scholasticus Theobald (in part), Mon. Culic., v, 380, 1910.

ORIGINAL DESCRIPTION OF CULEX SCHOLASTICUS:

Thorax chestnut-brown, with small dark brown curved scales and traces of two paler longitudinal lines; abdomen covered with dusky scales, each segment with a lateral dull white basal triangular spot. Legs unbanded, covered with deep purplish-black scales with sometimes bronzy reflections, coxae pallid, femora pale beneath, ungues of the ♀ small, equal, simple; of the ♂ unequal in fore and mid legs, equal and simple in hind; fore and mid uniserrated.

♀. Head with greyish-brown curved scales and black upright forked ones, with a border of pure silky-white ones around the eyes and with a few large black bristles projecting in front, flat white scales at the sides; palpi black, with pale pubescence and a few bristles near the base, paler in some lights; proboscis deep violet-black, apex paler; antennae brown, basal joint bright testaceous on one side, dark brown on the other, base of the second joint also testaceous; clypeus black; eyes purple and silvery.

Thorax brown, with small dark bronzy-brown curved scales and black bristles; when viewed in certain lights with a hand-lens it has a chestnut-brown appearance and two slightly pallid longitudinal lines; when denuded it is bright testaceous, with an indistinct median and two lateral longitudinal lines; scutellum pale silvery-brown, or pale ochraceous, with seven central bristles and eight or nine on each lateral lobe, and with dark scales; metanotum chestnut-brown in some lights, purplish-brown to pale ochreous brown in others; pleurae pale brown to silvery-grey, with a few white scales and a few small black hairs.

Abdomen covered with deep purplish-black scales, each segment having a lateral basal patch of creamy-white scales which are continued on to the sides of the abdomen and form distinct lateral patches, the last segment with a basal creamy-white band and numerous dark bristles, each segment bordered posteriorly with golden bristles, first segment ochraceous-brown, with two small patches of deep purplish-black scales; venter densely white scaled.

Legs with the coxae pallid grey; under surfaces of the femora pale, remainder covered with dark scales, sometimes showing ochraceous brown tinges on the femora, the rest of the legs with dull metallic purple or blue reflections in some lights, brown in others; tibial joint with a pale orange-yellow spot at the apex; ungues small, equal and simple. The tibiæ are slightly ciliated at the apex and also at the base of the metatarsi, especially of the hind legs.

Wings with the first sub-marginal cell longer and narrower than the second posterior cell, its stem short, only about one-third the length of the cell, base of the cell nearer the base of wing than that of second posterior cell; posterior cross-vein longer than the mid cross-vein, about twice its own length distant from the mid cross-vein; fringe rather deep brown.

Halteres with pale grey stem, fuscous knob.

Length: 4.5 mm. to 5 mm.

♂. Head as in the ♀, but with more silvery scales; antennæ banded brown and white, plumes brown, basal joint very bright testaceous; proboscis brown, slightly testaceous at the base; palpi brown, almost black towards the apex, considerably longer than the proboscis, which ends just in front of the base of the penultimate joint at the palpi; no hair-tufts to the palpi, hairs very small.

Abdomen narrow, the lateral patches of pale scales are small, the edges and bases of the segments partly nude and very pale, giving the abdomen a quasi-banded appearance; there are also a few white basal scales on some segments; claspers brown, terminal joints very pale; ungues of the fore and mid legs unequal, both with a single tooth, that on the smaller claw minute and pointed, the tooth being nearly straight, hind ungues both very small, equal and simple.

Length.—4.8 to 5 mm.

Habitat.—Grenada, West Indies (W. E. Broadway, February 14, 1900, and 63); St. Vincent, Cumberland Bay, and Richmond Estate Works (H. Powell, No. 111, June 10, 1899); St. Lucia (O. Galgey, December 21, 1899).

Time of capture.—May (May 16, 1899), St. Vincent; February and March in Grenada.

Observations.—This is a very easily recognized species, by the deep chestnut-brown thorax, dark abdomen, with white lateral patches, and very pale pleurae and bases to the legs.

Digitized by Google

It is evidently a very abundant West Indian species a large series being sent from St. Lucia, St. Vincent, and Grenada. The Grenada species were taken on the Ballast Ground and in the Botanic Station. The ciliate hind tibio-metatarsal joint also seems characteristic. I cannot satisfactorily identify it with any described species.

There are no specimens of this species in the U. S. National Museum.

The larva is unknown and the life history and habits are unknown.

It seems very doubtful to us that the specimens later referred to *Culex scholasticus* by Theobald (Mon. Culic., iii, 224, 1903) really belong to this species. According to the opinion of Mr. F. W. Edwards, who has examined the types, *Culex scholasticus* is a synonym of *Culex inflictus*. From the descriptions there appear to be some differences in the color of the occiput, and we have provisionally kept the names separate in our tables. The specimens identified by Coquillett as this species are *Culex similis* Theobald. Coquillett referred this species to the genus *Grabhamia*, having been misled by a wrong association of larvæ (U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906); the larvæ in question belonged to *Psorophora cingulatus* Fabricius.

CULEX DECEPTOR Dyar & Knab.

Culex deceptor Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 257, 1909.

ORIGINAL DESCRIPTION OF CULEX DECEPTOR:

Legs dark-scaled. Proboscis swollen at the tip. Occiput dark-scaled, the eyes margined with whitish. Venter of the abdomen black and white-banded, the upper surface dull black without dorsal bands, but with pale lateral spots; forks of the second vein with long ligulate scales.

Three specimens, Fort White, Florida (H. Byrd).

Type no. 12104, U. S. N. M.

DESCRIPTION OF FEMALE AND MALE OF CULEX DECEPTOR (LARVA UNKNOWN).

Female.—Proboscis moderate, swollen at tip, labellæ conically tapered; vestiture black with bronzy reflection; setæ minute, curved and black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as the proboscis, black, with a few outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, blackish, second joint a little longer than third; tori subspherical, with a cup-shaped apical excavation, luteous shading to brown within; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, convex, brown, nude. Eyes black. Occiput blackish, clothed with broad, flat black scales with a bronzy reflection in some lights, scales along ocular margin white; a patch of white scales well down the sides, many erect, forked black scales dorsally; a row of bristles along margins of the eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and brown bristles. Mesonotum dark brown, clothed with narrow, curved, dark bronzy-brown scales and rows of dark bristles. Scutellum trilobate, with similar vestiture to mesonotum, with a tuft of black bristles on each lobe. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ luteous, shaded with brownish, with patches of elliptical white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black, a row of lateral, triangular, basal segmental, white patches; venter blackish scaled, a broad white band at base of each segment, apices of segments with rather coarse pale hairs; apex of abdomen, particularly beneath, densely hairy.

Wings moderate, hyaline; petiole of second marginal cell less than one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant nearly twice its length from anterior cross-vein; scales of veins brown, with a blue reflection along costa, most of the outstanding ones long and ligulate on second to fourth veins outwardly, those at tip narrowly lanceolate. Halteres whitish, with blackish knobs.

Digitized by Google

Legs moderate; vestiture black with a blue and bronzy reflection on tibiæ and tarsi; femora whitish beneath except at tip. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis long, straight, slender, slightly enlarged towards apex, black scaled. Palpi exceeding the proboscis by nearly the length of the last two joints, which, with the end of the long joint, are slightly enlarged and moderately hairy; vestiture entirely dark. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls. Coloration similar to the female. Abdomen, elongate, expanding apically, lateral spots visible dorsally on fifth to seventh segments; lateral ciliation coarse and dense, brown, but not forming a distinct lateral fringe. Wings scarcely narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 12, fig. 82): Side-pieces over twice as long as wide, tips conically tapered, median prominence divided into two slender portions, the outer one bearing two rods and a leaf-like appendage, the inner one furcate and bearing a filament on each fork, tips of filaments expanded. Clasp-filament enlarged at base, slender in middle, tips swollen, serrate along outer margin, terminating in a large tooth at tip close to the articulated terminal spine. Harpes with a long, slender inner branch which is bent at tip and bears a row of teeth. Harpagones divided into a number of plates, their corners projecting as sharp angles.

The larva, life history and habits are unknown.

Florida and Georgia.

Fort White, Florida (H. Byrd); Georgia (W. V. Reed).

CULEX INCRIMINATOR Dyar & Knab.

Culex incriminator Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 257, 1909.

ORIGINAL DESCRIPTION OF CULEX INCRIMINATOR:

Entirely similar to *Culex deceptor* Dyar and Knab, except in the scaling of the veins. The scales of the present form are elliptical on the forks of the second vein.

Three specimens, Agricultural College, Mississippi (W. V. Reed); sent to us under the name *Melanoconion atratus* by Prof. Glenn W. Herrick.

Type no. 12105, U. S. N. M.

DESCRIPTION OF FEMALE AND MALE OF CULEX INCRIMINATOR (LARVA UNKNOWN):

Female.—Proboscis moderate, swollen at tip, labellæ conically tapered; vestiture black with bronzy reflection; setæ minute, curved and black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, black, with a few outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, blackish, second joint a little longer than third; tori subspherical, with a cup-shaped apical excavation, luteous shading to brown within; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, convex, brown, nude. Eyes black. Occiput blackish, clothed with broad, flat black scales with a bronzy reflection in some lights, scales along ocular margins white, a patch of white scales well down the sides, many erect, forked black scales dorsally; a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and brown bristles. Mesonotum dark brown, clothed with narrow, curved, dark bronzy-brown scales and rows of dark bristles. Scutellum trilobate, with similar vestiture to mesonotum, with a tuft of black bristles on each lobe. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ luteous, shaded with brownish and with patches of elliptical white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture dull black, a row of lateral, triangular, basal, segmental, white patches; venter black-

Digitized by Google

ish scaled, a broad white band at base of each segment; apices of segments with rather coarse hairs; apex of abdomen, particularly beneath, densely hairy.

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant nearly twice its length from anterior cross-vein; scales of veins brown, with a blue reflection along the costa, outstanding scales ovate outwardly on second to fourth veins and forks of fifth. Halteres whitish, with blackish knobs.

Legs moderate; vestiture black, with a blue and bronzy reflection on tibiæ and tarsi; femora whitish beneath except at tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis long, straight, slender, gradually enlarged towards apex, black scaled. Palpi exceeding the proboscis by nearly the length of the last two joints, which, with the end of the long joint, are slender, and sparsely hairy; vestiture entirely dark. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls. Coloration similar to the female. Abdomen elongate, expanding apically, tip much enlarged by genitalia; lateral ciliation coarse and rather short, brown, but not forming a distinct lateral fringe. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 10, fig. 71): Side-pieces as long as wide, subspherical, with excavated base; lateral prominence divided, outer part slender, bearing an irregularly expanded leaf-like appendage, an expanded filament and two setæ; inner part divided, each portion bearing a filament with hooked tip, lower branch very short and sessile. Clasp-filament thick, contracted mesially, tip thickened, hirsute without and pointed at tip with a stout claw and a spine in addition. Inner branch of harpes long, slender, with comb-like tip. Harpagones divided into several plates, one of them slender with expanded and excavated tip. Basal appendages small, irregularly elliptical, setose. Penultimate segment of abdomen excavated below with a narrow thickened rim and hairy lobe on either side.

Life history and habits unknown.

Southern Mississippi Valley.

Agricultural College, Mississippi, August 18, 1905 (W. V. Reed).

CULEX CONSPIRATOR Dyar & Knab.

Culex conspirator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 217, 1906.
Culex conspirator Busck, Smiths. Misc. Colls., quart. iss., lii, 68, 1908.

ORIGINAL DESCRIPTION OF CULEX CONSPIRATOR:

As in the preceding species, but differentiated by the characters given in the table.

Collected by the junior author at Almoloya, Oaxaca, Mexico, in a large pot hole full of clear water and in a shallow pool frequented by cattle at Las Loras near Puntarenas, Costa Rica. The specimens were named "*Melanoconion atratus* Theob."

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender.	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout	19
19.	Air tube with long well-defined tufts	20
20.	Body spicular-pilose	21
21.	Five tufts on tube with the basal one very long, the rest progressively shorter; abdominal hairs in threes on segments 3 to 5.	23
23.	Upper head hair single; tufts of tube all shorter than half its length	24
24.	Pecten of tube dense and fine, not as long as diameter of tube	25
25.	Dorsal hairs small; antennæ pale at base	*conspirator*

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX CONSPIRATOR:

Female.—Proboscis rather long and slender, swollen at tip; vestiture dark brown, labellæ conically tapered, pale; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as proboscis, uniform, dark brown, a few outstanding hairs at base. Antennæ moderate; joints subequal, rugose, pilose, black, second joint slightly longer than third; tori subspherical, with a cup-shaped apical excavation, brown within. Clypeus triangular, convex, brown, nude. Occiput blackish, clothed with flat blackish scales, a few narrow, curved brown scales behind, dorsally many erect forked black ones, a large patch of flat white scales on the sides, continued narrowly along margins of eyes to vertex; a row of black setæ along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow pale scales and brown setæ. Mesonotum dark brown clothed with narrow, curved bronzy-brown scales; bristles long, numerous, coarse, and black. Scutellum trilobate, with similar vestiture to mesonotum, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ greenish white with a diffuse blackish shade centrally, with a few flat white scales and rows of pale bristles; coxæ pale green.

Abdomen subcylindrical, truncate at tip; dorsal vestiture black with bronzy and blue reflections, a row of lateral, basal, segmental, triangular white patches; venter banded with black and white, basal halves of segments white; tips of segments with pale, rather long hairs; end of abdomen bristly.

Wings moderate, hyaline; petiole of second marginal cell one-fifth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; scales of veins bronzy brown, with a blue reflection on the costa, denser towards tip of wing, outstanding ones narrowly ovate on forks of second and fourth veins, apical portion of third and tip of upper fork of fifth. Halteres whitish, knobs darker.

Legs moderate, vestiture bronzy brown, femora with a blue reflection, paler beneath. Claw formula, 0.0–0.0–0.0.

Length: Body 2.5 mm.; wings 2.5 mm.

Male.—Proboscis straight, slender basally, gradually enlarged towards apex, dark scaled. Palpi exceeding the proboscis by more than the length of the last joint; last two joints somewhat thickened and with tip of long joint hairy; vestiture entirely bronzy black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, ringed with black at insertions of hair-whorls; hairs dense, long, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, vestiture sparser. Abdomen stout, subcylindrical, somewhat enlarged at apex; lateral segmental white patches large, visible dorsally; ciliation coarse, black, irregular, tip with numerous long bristles. Claw formula, 1.0–1.0–0.0.

Length: Body 3 mm.; wing 2.5 mm.

Genitalia (plate 10, fig. 70): Side-pieces over twice as long as wide, tips conically tapered, a subapical prominence divided into three portions, the outer portion bearing two rods, a leaf-like appendage and two filaments, the other two bearing each a single filament with expanded tip. Clasp-filament narrowed at middle, tip expanded something in the shape of a foot with a row of spines on outer edge, an articulated terminal spine. Harpes with a long, slender inner branch, enlarged at tip and bearing a row of teeth. Harpagones small, lamelliform. Basal appendage elliptical, oblique, setose.

Larva, Stage IV (plate 104, fig. 346).—Head rounded, widest through eyes, bulging at sides, a large notch at insertion of antennæ, front margin rounded.

Digitized by Google

Antennæ large, slightly curved, thick and well spined on basal two-thirds, a large tuft from a notch; two long subapical setæ, a long seta, a short one and a digit at tip. Upper pair of dorsal head-hairs double and small, lower pair single and long, ante-antennal tuft multiple. Mental plate small, triangular, with a large central tooth and six on each side, basal ones more remotely spaced. Mandible quadrangular, with a few small hairs near base; two filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of transverse rounded prominences considerably within outer margin, each bearing a long fine hair and tuft of small ones; dentition of three teeth on a process and a group of spines below; a spine before, a long smooth filament, a short slender one and row of feathered hairs within; process below irregular on front margin, obscurely furcate, with a row of hairs and tuft at tip; basal angle small, with a row of stout hairs within; a row of hairs at base. Maxilla elongate, rather bluntly rounded at tip, divided by a suture; inner half with long spines along margin, some short ones within and a curved row of fine hairs at base; a row of long hairs at tip, running down along the suture; outer half with two filaments below middle and a patch of hair before. Palpus short, not longer than broad, with long, slender apical digits, longer than palpus. Thorax rounded, wider than long. Abdomen moderate, the anterior segments shorter; lateral hairs in threes on first segment, in twos on second, in threes on third to sixth; skin pilose. Air-tube elongate, gradually tapered, over five times as long as wide; pecten reaching about one-third, single teeth serrate along one side; five tufts along the posterior margin beyond pecten, becoming shorter outwardly. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened outwardly, with an apical fringe of spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft of two long and two short hairs on each side; ventral brush well developed, confined to the barred area. Anal gills as long as the segment or longer, tapered on outer half.

The larvæ live in pools and the edges of streams, where protected by vegetation.

Mr. Knab collected the larvæ in a large pot-hole beside a stream, with clear water and dead leaves, and in a puddle in a wagon track in a shaded place; Mr. Busck got them in the edges of a slowly running stream among grass; Mr. Jennings got them in a swamp back of a dump, from the margin of a river running rapidly, in a reservoir, from a pool, from a stream, from a pond, and from small lagoons at the edge of a beach.

Southern Mexico and Central America.

Almoloya, State of Oaxaca, Mexico, July 21, 1905 (F. Knab); Sonsonate, Salvador, August 20, 1905 (F. Knab); Pedro Miguel, Canal Zone, Panama, April 24, 1907 (A. Busck); Pedro Miguel, Canal Zone, Panama, December 7, 1907 (A. H. Jennings); Miraflores, Canal Zone, Panama, December 10, 1907 (A. H. Jennings); Rio Grande, Canal Zone, Panama, December 14, 1907 (A. H. Jennings); Las Cascadas, Canal Zone, Panama, December 27, 1907 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, January 3, 1908, February 12, 1909 (A. H. Jennings); Tabernilla, Canal Zone, Panama, December 15, 1908 (L. Espey).

CULEX CARCINOPHILUS Dyar & Knab.

Culex carcinophilus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 220, 1906.

ORIGINAL DESCRIPTION OF CULEX CARCINOPHILUS:

Antennæ with the tuft beyond the middle, dark; upper head tuft multiple, lower single; body spicular, not pilose; lateral hairs in twos on the second abdominal segment, in threes on the third to sixth. Air tube very long, 10 × 1, straight; four small, two-haired tufts on posterior margin; pecten of long spines outwardly, reaching to one-sixth. Lateral comb of the eighth segment large; anal gills very small.

Collected by Mr. Busck from crab holes containing fresh water near San Domingo City. The adults were named "*Melanoconion atratus* Theob."

Digitized by Google

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender. 5
5. Air tube four times as long as wide or over..... 7
7. Anal appendages four, normal..... 8
8. Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent. 18
18. Air tube without a crown of spikes, smooth throughout..... 19
19. Air tube with small double or single hairs, or bare..... 31
31. Air tube uniform, without any swelling..... 32
32. Air tube with slight tufts..... 33
33. Pecten of the air tube reaching one-fourth or less..... 35
35. Pecten dense and fine; lateral hairs in threes after the second segment ..... *carcinophilus*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX CARCINOPHILUS:

Female.—Proboscis rather short and moderately stout, enlarged at apex, black with bronzy luster, labellæ paler; setæ minute, curved, black, those on the labellæ more prominently outstanding. Palpi short, one-fifth as long as the proboscis, brown scaled. Antennæ slender, as long as proboscis, with whorls of rather long and sparse hairs; tori brownish. Clypeus large and prominent, subconical, brown. Occiput clothed with flat, broad black scales with a bronzy luster, and sparse, slender, erect, forked black scales dorsally; ocular margins broadly and the cheeks white scaled.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and coarse bristles. Mesonotum dark brownish; vestiture rather dense, of small, narrow, curved light bronzy-brown scales; setæ rather sparse but coarse and long, arranged in subdorsal and lateral rows and a small median group near front margin. Scutellum trilobate, with narrow, curved bronzy-brown scales, each lobe with a group of black setæ. Postnotum luteous, with a faint median ridge, nude. Pleuræ and coxæ pale grayish luteous, with rows of dark bristles.

Abdomen subcylindrical, depressed, truncate at tip, with coarse terminal bristles; dorsally clothed with bronzy-brown scales, with lateral, basal, segmental, leaden white triangular spots; venter bronzy brown, with leaden white basal segmental bands, broadest at middle; hind margins of segments with sparse pale setæ.

Wings moderately broad; veins with brown scales, mostly narrow, but narrowly ovate on apical portion of wing and dense along forks of second vein; petiole of second marginal cell about one-fifth the length of its cell; that of second posterior cell shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein.

Legs rather long, slender; vestiture brownish black; femora with blue iridescence and pale beneath to near apices; tibiæ and tarsi with bronzy luster. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis moderately long, rather stout, straight, enlarged at apex, brownish-black scaled, labellæ paler. Palpi long and slender, slightly exceeding the proboscis in length; last two joints and end of long joint slightly thickened and with numerous coarse long hairs; vestiture of bronzy-brown scales, without pale rings. Antennæ densely plumose, with very long brown hairs. Coloration similar to the female. Abdomen long and slender, slightly larger at apex, lateral basal white marks visible dorsally on fifth, sixth, and seventh segments; under surface with numerous scattered hairs; lateral ciliation coarse but not very long. Wings narrower than those of the female, the stems of the fork-cells slightly longer; vestiture a little sparser. Claw formula, 1.0–1.0–0.0.

Length: Body 2.5 mm.; wing 2.5 mm.

Genitalia (plate 12, fig. 85): Side-pieces over twice as long as wide, conically tapered; marginal prominence extending from middle to near tip, divided into

Digitized by Google

three portions, outer portion slender, bearing a spatulate filament at its tip, three rods, a leaf-like appendage and a seta on its outer aspect, leaf-like appendage near base, seta at base, the two inner portions confluent at bases, each bearing a pointed tipped spatulate filament. Clasp-filament slightly enlarged at base, inflated beyond middle, where a number of long hairs arise on inner side, an articulated terminal claw. Harpes with a long, slender inner branch, bent at tip and bearing a row of teeth. Harpagones short, divided. Basal appendages elliptical, rather long, approximate at base, setose.

Larva, Stage IV (plate 109, fig. 368).—Head rounded, widest through eyes, bulging on sides, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, slightly curved, thick and well spined on basal two-thirds, a large tuft from a notch; two long subapical setæ, a long seta, a short one and a digit at tip. Upper pair of dorsal head-tufts multiple, lower pair single; ante-antennal tuft multiple. Mental plate triangular, with a large central tooth and eight on each side, basal ones larger and remotely spaced, the last one small. Mandible quadrangular; three filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of rounded transverse prominences well within outer margin, each bearing a long hair and a tuft of short ones; dentition of four irregular teeth on a prominence with some short spines below; a spine before, a long smooth filament and a row of feathered hairs within; process below obscurely furcate, irregular on both sides, with a small transverse longitudinal row of hairs and a tuft at tip of each limb; basal angle small, a row of hairs within spreading out towards basal row. Maxilla elongate, rather squarely terminated, divided by a suture; inner half with a row of long spines on margin, some of basal ones feathered; two rows of cilia within toward base with some small spines beyond; a stout articulated spine at the outer third; a row of long hairs at tip running down along the suture; outer half with two filaments at the basal third. Palpus rudimentary, with four long apical digits. Thorax rounded. wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, in twos on second, in threes on third to sixth segments; skin finely spinose. Air-tube long, straight, very slightly widened at base, over ten times as long as wide; pecten reaching to basal sixth, single teeth serrate along one side; four small, sparse tufts along posterior margin, the third out of line with the others. Lateral comb of eighth segment of many spines in a large triangular patch; single spine elongate, widened at tip, with an apical fringe of spinules. Anal segment twice as long as wide, ringed by the plate; dorsal tuft of two long hairs and a short one on each side; ventral brush well developed, confined to the barred area. Anal gills rudimentary, slender, the upper pair a little longer.

The larvæ live in the water in the holes made by certain species of crabs along the shore. Mr. Busck got them twice in such situations. The water in the holes was fresh. The habits of the adult are unknown.

Island of Santo Domingo, West Indies.

Santo Domingo, south of city, August 7, 1905 (A. Busck); Santo Domingo, near edge of river, August 8, 1905 (A. Busck).

CULEX ELEVATOR Dyar & Knab.

Culex elevator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 217, 1906.
Culex educator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 217, 1906.
Culex elevator Busck, Smiths. Misc. Colls., quart. iss., iii, 69, 1908.

ORIGINAL DESCRIPTION OF CULEX ELEVATOR:

Antennæ with the tuft beyond the middle, pale at base; head hairs single; body hairy; two lateral hairs on the second abdominal segment, three on the third to sixth. Air tube 6 × 1, nearly straight with very long pecten; five tufts on the posterior margin; anal gills short.

Digitized by Google

Taken by the junior author in a pool of clear water containing vegetable debris at the head of a small stream two miles west of Port Limon, Costa Rica. The adults were not bred.

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender. 5
5. Air tube four times as long as wide or over..... 7
7. Anal appendages four, normal..... 8
8. Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent. 18
18. Air tube without a crown of spikes, smooth throughout..... 19
19. Air tube with long well-defined tufts..... 20
20. Body spicular-pilose 21
21. Five tufts on tube with the basal one very long, the rest progressively shorter; abdominal hairs in threes on segments 3 to 5. 23
23. Upper head hair single; tufts of tube all shorter than half its length 24
24. Pecten sparse and open, equalling the diameter of the tube at middle ..... *elevator*

ORIGINAL DESCRIPTION OF CULEX EDUCATOR:

Antennæ with the tuft at outer third, dark; head hairs single; body coarsely hairy; lateral hairs in twos on the second segment, in three on the third to sixth; subdorsal hairs long, stellate; tracheæ narrow. Air tube 6 × 1, a little tapered, pecten moderate; five tufts on the posterior margin decreasing to tip.

Collected by the junior author in an old stream bed disconnected from the stream, containing fish, but the larvæ in reeds at the edge, Rio Aranjuez, near Puntarenas, Costa Rica. The adults were named "*Melanoconion atratus* Theob." by Mr. Coquillett.

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender. 5
5. Air tube four times as long as wide or over..... 7
7. Anal appendages four, normal..... 8
8. Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or hairs obsolete or absent.... 18
18. Air tube without a crown of spikes, smooth throughout..... 19
19. Air tube with long, well-defined tufts..... 20
20. Body spicular-pilose 21
21. Five tufts on tube with the basal one very long, the rest progressively shorter; abdominal hairs in threes on segments 3 to 5. 23
23. Upper head hair single; tufts of tube all shorter than half its length 24
24. Pecten of tube dense and fine, not as long as diameter of tube..... 25
25. Dorsal hairs stellate, long; antennæ dark..... *educator*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX ELEVATOR:

Female.—Proboscis rather long, swollen at tip, labellæ conically tapered; vestiture black with a slight bronzy reflection; setæ minute curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, slender, black, with a few outstanding setæ at base. Antennæ moderate, joints subequal, rugose, coarsely pilose, black, second joint not much longer than third; tori subspherical, with a cup-shaped apical excavation, yellowish, brown on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, convex, brown, nude. Eyes black. Occiput brown, clothed with broad, flat bronzy-brown scales with a gray luster in some lights and many erect, forked black ones, a patch of flat white scales low down on the side, a row of bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and black setæ. Mesonotum dark brown, clothed with narrow, curved, light bronzy-brown scales and with rows of coarse black bristles. Scutellum trilobate, with similar vestiture to mesonotum, each lobe with a group of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ dark greenish, with rows of brown bristles.

Digitized by Google

Abdomen subcylindrical, truncate at tip, clothed dorsally with black scales with a coppery or blue reflection, a row of lateral triangular segmental sordid silvery spots; venter dark with indistinct sordid silvery basal segmental bands.

Wings moderate, hyaline; petiole of second marginal cell about one-fifth as long as its cell, that of the second posterior cell shorter than its cell; basal cross-vein distant about twice its own length from anterior cross-vein; scales of veins brown, outstanding ones rather broadly ovate outwardly on second to fourth veins and upper branch of fifth. Halteres whitish, with dark knobs.

Legs rather long, slender; vestiture black with a bronzy and blue reflection; femora whitish beneath to near apices. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis long, straight, slender, expanding towards apex, black-scaled. Palpi exceeding the proboscis by more than the length of the last joint, slender, black, with black hairs on end of long joint and on last two joints, which are slightly enlarged; vestiture bronzy brown. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with thick black rings at insertion of hair-whorls; hairs long, dense and black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells slightly longer. Abdomen subcylindrical, somewhat longer than in the female; lateral white spots tending to form dorsal bands; ciliation coarse, dark, but not forming a distinct lateral fringe. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 11, fig. 76): Side-pieces over twice as long as wide, tips conically tapered; a prominence rising somewhat beyond middle, divided into two branches, the outer long, narrow, bearing five rods and a filament at tip, inner forked, each branch bearing a filament expanded near apex and terminating in a sharp point. Clasp-filament slightly swollen at base, tip expanded narrowly with five short setæ along outer edge; an inserted terminal claw. Harpes with a long, slender inner branch with a short comb of spines at tip; outer branch short, curved. Harpagones with a slender branch denticulate at tip and other smooth lamellæ. Basal appendages oblique, setose.

Larva, Stage IV (plate 106, fig. 354.)—Head rounded, widest through eyes, bulging on sides, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, curved, basal two-thirds thick and well spined, with a large tuft from a notch; two long subapical setæ, a long seta, a short one, and a digit at tip. Both pairs of dorsal head-hairs single; ante-antennal tufts multiple. Mental plate small, a large central tooth with tapered tip, four small teeth on each side, followed by two larger somewhat projecting ones and a small seventh tooth basally. Mandible quadrangular; three filaments before tip; an outer row of cilia from a collar; a row of rounded transverse prominences from outer margin bearing short hair-tufts; dentition of four irregular teeth with some short spines below; two spines before, a smooth filament, a stout spine and row of feathered hairs within; process below shortly angled at base, obscurely furcate, with a row of hairs along outer side and a tuft at tip; basal angle small, a row of stout hairs within; a row of long basal hairs. Maxilla elongate, rather narrow, divided by a suture; inner half with long spines on margin, basal ones feathered, a patch of coarse hairs within and two rows of cilia towards base; a row of long hairs at tip, running down along suture, a stout articulated spine at outer third next suture, from inner half; two filaments below at basal third from outer half. Palpus very small, conical, with four long claw-like digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, in twos on second, in threes on third to sixth; skin pilose. Air-tube slender, nearly straight, tapering, about six times as long as wide; pecten dense, of very long teeth, reaching to basal

Digitized by Google

two-fifths; single tooth broad, with numerous lateral serrations; five large tufts in a straight line on posterior margin, becoming progressively shorter toward apex. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at tip, with an apical fringe of spinules. Anal segment much longer than wide, ringed by the plate; dorsal tuft of two long hairs and a short one on each side; a small triple lateral hair; ventral brush well developed, confined to the barred area. Anal gills moderate, about as long as the segment, regularly tapered.

The larvæ live in ground-pools. Mr. Knab got them in a pool in a stream-bed and in a pool of clear spring-water; Mr. Busck got them in a slowly running spring full of leaves and from a small stream; Mr. Jennings got them in pools in rocks along a stream.

Central America.

Rio Aranjuez, near Puntarenas, Costa Rica, September 12, 1905 (F. Knab); Port Limon, Costa Rica, September 30, 1905 (F. Knab); Tabernilla, Canal Zone, Panama, May 2 and 13, 1907 (A. Busck); Caldera Island, Porto Bello Bay, Panama, May 29, 1908 (A. H. Jennings).

Culex elevator was originally characterized twice from the larva, under two different names. This was due to an error of observation in the case of *Culex educator,* the artist having drawn the pecten of the air-tube too short. It is in reality long, as in the figure of *Culex elevator,* as a reëxamination of the specimens shows.

CULEX INTERROGATOR Dyar & Knab.

Culex interrogator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 205, 209, 1906.

ORIGINAL DESCRIPTION OF CULEX INTERROGATOR:

The antennæ have the normal structure for *Culex*, but the air tube is short as in *Aëdes*. Its pecten is stout and runs to the apical fourth. There are three hair tufts and a fourth smaller, placed laterally. The comb of the eighth segment is in a long straight row, supplemented by a second shorter one. The anal segment is normal. The skin is pilose; the tracheæ broad.

Collected by the junior author at Rincon Antonio, Mexico, in ditches. The adults were named "*Culex ? salinarius* Coq." by Mr. Coquillett, with which species they have nothing whatever to do.

The following is an abstract of the table:

1. Antennæ with the tuft outwardly placed, the part beyond slender.. 5
5. Air tube three times as long as wide or less..... 6
6. Body pilose; pecten of the air tube to three-fourths..... *interrogator*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX INTERROGATOR:

Female.—Proboscis rather stout, slightly enlarged at tip, labellæ conically tapered; vestiture bronzy black, broadly whitish beneath in the middle, labellæ paler; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, black, one-fifth as long as proboscis, with a few outstanding setæ at base. Antennæ moderate, joints subequal, rugose, pilose, black, second joint a little longer than third; tori subspherical, with a cup-shaped apical excavation, brown; hairs of whorls moderate, sparse, black. Clypeus triangular, convex, black, nude. Eyes black. Occiput brown, clothed with narrow, curved, very pale brownish scales, denser laterally, and many erect, forked bronzy-brown ones, the lower parts of the sides and the margins of the eyes white scaled.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and brown bristles. Mesonotum dark brown, with two longitudinal bare impressed lines, clothed with golden-brown, narrow curved scales; shining whitish around the edges, about ante-scutellar space, and in two spots on the disk; bristles coarse, deep brown, those at lateral margins pale. Scutellum trilobate, luteous, clothed with narrow whitish scales, each lobe with a group of black bristles.

Digitized by Google

Postnotum elliptical, prominent, luteous-brown, nude. Pleuræ and coxæ luteous-brown, with rows of brown bristles and patches of dull white scales.

Abdomen subcylindrical, truncate at tip; dorsal vestiture brownish black, with narrow whitish basal segmental bands, basal segment with a patch of dark scales, second segment with only a few white scales in the middle, terminal one whitish with a small apical dark band, a row of lateral, segmental, basal, triangular white patches joined to the bands; venter whitish scaled.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; scales of veins brown, with bluish reflection on costa, outstanding ones near tip of wing long and linear, dense on forks of second vein. Halteres whitish, knobs darker.

Legs slender, moderately long; vestiture black with bronzy reflection; femora dull white scaled beneath to near apices; tibiæ and tarsi pale beneath with brassy luster; knees and apices of tibiæ pale. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 2.8 mm.

Male.—Proboscis straight, long and slender, enlarged apically, a pale ring beyond the middle, more distinct on under side. Palpi exceeding the proboscis by nearly the length of the last two joints, which, with end of long joint, are slightly enlarged and densely hairy; vestiture bronzy brown, a line of pale scales on under side. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black thick rings at insertions of hair-whorls; hairs long, dense, silky brown. Coloration similar to the female. Abdomen elongate, depressed, somewhat broadened on distal half; dorsal white bands broader than in the female, those on fifth, sixth, seventh and eighth segments laterally expanded; lateral ciliation fine and abundant, pale brown. Wings narrower than in the female, the stems of the fork-cell longer; vestiture sparser. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 15, fig. 112): Side-pieces more than twice as long as wide, conically tapered at tip, a slender quadrate median prominence, bearing four rods, a leaf-like appendage and a seta. Clasp-filament, moderate, slightly enlarged at base with an articulated terminal spine. Harpes divided, outer branch slender, curved, pointed, smooth, inner short, truncate, stout and with a row of terminal spines. Harpagones divided into a number of lamellæ. Basal appendages, short, remote, bearing four stout hairs.

Larva, Stage IV (plate 98, fig. 324).—Head rounded, widest through eyes, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, a large tuft from a notch at outer third, apical third more slender; three long setæ, a short one and a digit at tip; basal portion well spinulated. Both pairs of dorsal head-hairs long, in threes; ante-antennal tuft multiple. Mental plate triangular, a large central tooth and nine on each side, last two smaller and more remote. Mandible quadrangular; two long filaments, a short one and a tuft of hairs before tip; a row of cilia from a collar; a row of prominences on outer margin bearing hair-tufts; dentition of four teeth on a process, first longest; a spine before, four irregular teeth at base, a long smooth filament and five feathered hairs within; process below curved, obscurely furcate, with a transverse and a longitudinal row of hairs and hair-tufts at tip; basal angle small; a row of hairs within and a row at base. Maxilla elongate, divided by a suture; inner half with two feathery hairs at base and a double row of spines on margin; two rows of cilia within; a row of long hairs at tip running down along the suture; outer half with two filaments basally placed, a spine on the other side and some slight hairs towards base. Palpus small, digits rather long, irregular. Thorax rounded, wider than long. Abdomen moderate, anterior segments

Digitized by Google

shorter; skin pilose; tracheæ broad. Air-tube regularly tapered, about three times as long as wide; pecten running over two-thirds, basal teeth broad, flat and with four or five long branches, apical ones long, stout and smooth; three hair-tufts on posterior margin, the last one just beyond pecten, a smaller lateral hair-tuft before outer one. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, fringed with spinules at tip. Anal segment about as long as broad, ringed by the platæ; dorsal tuft of two long hairs and two shorter ones on each side; ventral brush well developed, confined to barred area. Anal gills long, twice as long as the segment, slender, gradually tapered.

The larvæ live in ground-pools. Mr. Knab found them in a small pool of very foul water among bones and rubbish.

Mexico.

Rincon Antonio, June 23, 1905 (F. Knab).

The specimens from Panama which we at first named as this species we have since decided to refer to *Culex reflector*.

CULEX REFLECTOR Dyar & Knab.

Culex regulator Busck (not Dyar & Knab), Smiths. Misc. Colls., quart. iss., lii, 67, 1908.

Culex interrogator Busck (not Dyar & Knab); Smiths. Misc. Colls., quart. iss., lii, 67, 1908.

Culex reflector Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 256, 1909.

ORIGINAL DESCRIPTION OF CULEX REFLECTOR:

In general similar to *C. restuans* Theobald; the head is entirely white-scaled behind and the impressed lines of the mesonotum are distinctly narrower; there is no thoracic ornamentation.

Four specimens, Ancon, Canal Zone, Panama, bred from larvæ found in a tree-hole with *Megarhinus* (A. H. Jennings).

Type no. 12101, U. S. N. M.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX REFLECTOR:

Female.—Proboscis moderate, slightly enlarged apically, labellæ conically tapered; vestiture black, with a whitish shade beneath to near the apex; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth the length of proboscis, uniform, clothed with blackish scales, setæ at base long and outstanding. Antennæ moderate, joints subequal, rugose, pilose, blackish, the second joint scarcely enlarged; tori subspherical, with a cup-shaped apical excavation, brown, darker within. Clypeus rounded triangular, convex, brownish black, nude. Eyes black. Occiput brown, clothed with narrow, curved whitish scales on the vertex, denser along margins of eyes, interspersed with scattered, erect, very slender forked, blackish scales; cheeks clothed with broad flat white scales; bristles along margins of eyes coarse, black.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with a few pale scales and brown bristles. Mesonotum brown, with two narrow, impressed, dorsal, bare lines, clothed with narrow, curved golden-brown scales, those around ante-scutellar space paler, and rows of black bristles; a pair of faint yellowish subdorsal spots on disk. Scutellum trilobate, grayish luteous, clothed with narrow, curved pale-yellowish scales, each lobe with a tuft of black bristles. Postnotum elliptical, grayish brown, nude. Pleuræ and coxæ dull luteous, with patches of flat white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip; clothed dorsally with blackish scales with a slight bluish reflection, each segment except the first with a moderate transverse band of yellowish-white scales at base, expanded at sides into a row of lateral spots; last segment entirely pale scaled; venter clothed with yellowish-white scales; hairs at apices of segments rather long, yellowish.

Digitized by Google

Wings moderate; hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about twice its own length from anterior cross-vein; scales of veins brown, with a bluish reflection on costa, outstanding ones linear, somewhat denser on forks of second vein and apical portion of third vein. Halteres whitish, with brownish knobs.

Legs moderately slender; vestiture of black scales with a bronzy and blue luster, femora broadly white beneath to tips; knees and tips of tibiæ whitish; tibiæ and tarsi with a brassy luster on under side, the bases of the tarsal joints slightly paler. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis straight, gradually enlarged towards apex, black scaled above, a broad pale diffuse ring near middle; under surface paler scaled, the ring more distinctly white. Palpi exceeding the proboscis by nearly the length of the last joint, slender, the apical portion somewhat enlarged; vestiture black, without rings; long, abundant black hairs on end of long joint and on last two joints. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with thick black rings at insertions of hair-whorls; hairs long, dense, brown; tori entirely brown. Coloration similar to the female. Abdomen elongate, depressed, slightly expanded towards apex; dorsal white bands slightly broader, laterally expanded on seventh segment; lateral ciliation long, fine, abundant, yellowish. Wings narrower than in the female, the stems of the fork-cells longer, vestiture less abundant, outstanding scales on apical portion of wing somewhat broader. Claw formula, 1.1–1.1–0.0.

Length: Body about 3.5 mm.; wing 2.7 mm.

Genitalia (plate 14, fig. 102): Side-pieces over twice as long as wide, rather slender, tips conically rounded; inner process stout, quadrate, situated well above middle bearing four rods, a leaf-like appendage and two setæ; clasp-filament tapering outwardly, with a small terminal claw. Harpes with inner limb stout tufted at tip, outer long, curved; harpagones divided into a number of intricate plates, forming a series of projecting points and teeth; basal appendages rounded, setose.

Larva, Stage IV (plate 98, fig. 323).—Head rounded, widest through eyes, wider than long; antennæ long, stout, a large tuft at outer third, the part beyond more slender, shaft spinose; both pairs of dorsal head-hairs in threes; ante-antennal tufts multiple. Body glabrous; lateral hairs of abdomen in sixes on first segment, fours on second, twos on third to fifth, single on sixth. Lateral comb of eighth segment of many spines in a large triangular patch. Air-tube about three times as long as wide, outwardly tapering; pecten reaching to three-fourths of length of tube, the teeth becoming long outwardly; three hair-tufts within pecten of two hairs each, a smaller lateral tuft before the last; terminal hooks minute. Anal segment about as long as wide, spicular posteriorly; dorsal tuft of three hairs on each side; lateral hair small, single; ventral brush well developed, confined by the chitinous ring. Anal gills twice as long as the segment, equal, their tips pointed.

The larvæ live in ground-pools and artificial receptacles. Mr. Busck got them in a stagnant pool and in a rain-barrel; Mr. Jennings got them in a tree-hole.

Panama.

Tabernilla, Canal Zone, April 26, 1907 (A. Busck); Ancon, Canal Zone, November 21, December 5 and August 9, 1908 (A. H. Jennings); Taboga Island (A. H. Jennings).

Culex reflector is allied to the more northerly distributed *Culex interrogator*, with which we at first identified it, and which identification was published by Mr. Busck. We find, however, certain differences which we consider to be of a specific character, as shown in the tables.

Digitized by Google

CULEX EGBERTI Dyar & Knab.

Culex egberti Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 214, 1907.
Culex egberti Theobald, Mon. Culic., v, 614, 1910.

ORIGINAL DESCRIPTION OF CULEX EGBERTI:

♀.—Proboscis moderately long and slender, swollen towards the tip, roughly black scaled; palpi short, black; occiput dark scaled; margins of the eyes dull whitish scaled; mesonotum brown scaled; pleura dark brownish with patches of whitish scales; metanotum dark brown; abdomen depressed, truncate at tip, black scaled above, without metallic luster, the segments with narrow white basal bands which are broadened at the sides, beneath with broad white basal bands; legs black scaled with bronzy luster, the femora light scaled beneath; claws equal and simple; scales of the wings long and dense, broad on some of the veins, uniformly brown. Length, 3 mm.

Three specimens, Warner's Camp, North Shore of Lake Okeechobee, Florida (J. H. Egbert).

Type.—No. 10876, U. S. National Museum.

Named in honor of Dr. J. H. Egbert, who collected these and other interesting mosquitoes in central Florida. Two of the specimens are distended with blood.

DESCRIPTION OF FEMALE OF CULEX EGBERTI (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather slender, slightly enlarged at apex, labellæ conically tapered; vestiture black with a bronzy reflection; setæ rather long, outstanding, sparse, black. Palpi moderate, one-fifth as long as proboscis, brownish black. Antennæ moderate, joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, dark brown. Clypeus rounded triangular, dark brown, nude. Eyes black. Occiput black, clothed with narrow, curved brassy-brown scales in the middle, broader, black ones on the sides, eyes bordered with white scales, many erect, forked black scales, denser laterally; cheeks white scaled.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow, curved whitish scales and black bristles. Mesonotum dark brown, clothed with rather coarse, narrow, curved, dark bronzy-brown scales, those over roots of wings and around ante-scutellar space paler; setæ coarse, brown. Scutellum trilobate, clothed with a few pale-brown scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ and coxæ dark brown, with patches of elliptical whitish scales and fine setæ.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black with a slight bronzy reflection, the segments, except the first, banded at base with white, widening at the sides; venter white scaled at bases of segments, with apical black bands.

Wings rather broad, hyaline; petiole of second marginal cell about one-fifth as long as its cell, that of second posterior cell one-half as long as its cell; basal cross-vein distant nearly twice its own length from anterior cross-vein; scales of veins dense, brown, the outstanding ones long, broadly linear, those on forks of second and fourth veins and outer half of third denser ligulate. Halteres whitish, with dark brown knobs.

Legs rather long, slender; vestiture black with a slight bronzy and blue reflection; femora whitish beneath nearly to the tips, their apices whitish above. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Life history and habits unknown.

Southern Florida.

Warner's Camp, north shore of Lake Okeechobee, March, 1906 (J. H. Egbert).

Digitized by Google

CULEX MUTATOR Dyar & Knab.

Culex mutator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 216, 1906.
Culex mutator Dyar, Proc. Ent. Soc. Wash., viii, 17, 1906.

ORIGINAL DESCRIPTION OF CULEX MUTATOR:

Antennæ with the tuft near the outer third, pale at base; upper head tuft of three, lower single; body pilose. Air tube 5 × 1, tapered, five or six tufts along the posterior margin, the basal one longest; pecten long, but not immoderately so.

Collected by the junior author at Cordoba, Mexico, in puddles in a ravine. The adults were named "*Melanoconion humilis* Theob." by Mr. Coquillett, but we see no reason to accept this determination. *M. humilis* was described from São Paulo, Brazil.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent	18
18.	Air tube without a crown of spikes, smooth throughout	19
19.	Air tube with long well-defined tufts	20
20.	Body spicular-pilose	21
21.	Five tufts on tube with the basal one very long, the rest progressively shorter; abdominal hairs in threes on segments 3 to 5.	23
23.	Upper head hair triple; tufts of tube long, the basal one over half the length of the tube	*mutator*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX MUTATOR:

Female.—Proboscis slender, enlarged apically, vestiture black with bronzy luster, labellæ conically tapered; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, about one-fifth as long as proboscis, uniform, dark brown, a few outstanding hairs at base. Antennæ moderate, joints subequal, rugose, coarsely pilose, black, second joint slightly longer than third; tori subspherical, with a cup-shaped apical excavation, luteous, brown within. Clypeus rounded triangular, convex, brown, nude. Occiput blackish, clothed with narrow, curved brown scales on the vertex, intermixed with erect, short forked shining brown ones, a large patch of flat, deep bronzy brown scales on the sides and along margins of eyes to vertex, a patch of flat white scales well down the sides; a row of coarse black setæ along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and black bristles. Mesonotum dark brown, clothed with small, narrow, curved bronzy-brown scales; bristles long, coarse, black. Scutellum trilobate, with similar vestiture to mesonotum, but with a whitish reflection, each lobe with a tuft of black bristles. Postnotum elliptical, dark brown, nude. Pleuræ dull brown mottled with blackish, coxæ luteous, with a few flat white scales, and rows of pale brown bristles.

Abdomen subcylindrical, truncate at tip; dorsal vestiture black with coppery and blue reflections; segments, except the first, with narrow, dull silvery-white basal bands, first two interrupted at the sides, the others continuous, joined to a row of lateral, basal, segmental, triangular white patches; venter banded with coppery black and dull white, the basal thirds of the segments white; bristles on tips of segments coarse and pale, dense at tip of last segment.

Wings moderate, hyaline; petiole of second marginal cell about one-fifth as long as its cell, that of second posterior cell much shorter than its cell; basal cross-vein distant rather more than its own length from anterior cross-vein; scales of veins bronzy brown, costa with a blue reflection, outstanding scales on second to fourth veins towards tip of wing denser and narrowly ovate. Halteres whitish, the knobs darker.

Digitized by Google

Legs rather long, slender; vestiture bronzy brown; femora with a blue reflection, whitish beneath nearly to apices. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis long and slender, straight, gradually enlarged towards apex, black scaled with a bronzy luster. Palpi exceeding the proboscis by more than the length of the last joint; last two joints slender, and with tip of long joint moderately hairy; vestiture bronzy black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, ringed with black at insertions of hair-whorls; hairs dense, long, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cell longer, vestiture sparser. Abdomen elongate, subcylindrical, slender; dorsal white bands broader; ciliation coarse, brown, not forming a distinct lateral fringe. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.2 mm.

Genitalia (plate 10, fig. 68): Side-pieces over twice as long as wide, tips conically tapered, three prominences on inner margin, the distal one stout, long, bearing a filament with hooked tip, a large leaf-like appendage and three short filaments, proximal two joined at base, each branch bearing a long filament with expanded tip and recurved apical point. Clasp-filament expanded outwardly, outer margin obliquely cut and serrate, inner half partly divided off and bearing an articulated terminal claw. Harpes and harpagones divided, inner branch of harpes long and slender and terminating in a narrow cluster of teeth. Basal appendages remote, oblique, and setose.

Larva, Stage IV (plate 108, fig. 361).—Head rounded, widest through eyes, bulging on the sides, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, curved, basal two-thirds thick and well spined, with a large tuft from a notch; two long subapical setæ, a long seta, a short one and a digit at tip. Upper pair of dorsal head-hairs double, lower pair single; ante-antennal tufts multiple. Mental plate small, triangular, with a large central tooth, five large teeth on each side and a small basal tooth. Mandible quadrangular; three filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of rounded transverse prominences on outer margin, each bearing a fine, rather long hair and tuft of short ones; dentition of four irregular teeth and stout spines below; a small spine, a long filament and row of feathered hairs within; process below obscurely furcate, with a longitudinal and a transverse row of hairs and a tuft at tip of each limb; basal angle small; a row of hairs within in line with basal hairs and approximated to them. Maxilla elongate, conical at tip, divided by a suture; inner half with a row of long spines on margin, basal ones feathered; a patch of coarse hairs within, occupying basal portion; a row of long hairs at tip running down along the suture; outer half with a pair of filaments below middle and some fine hairs near base. Palpus very small, with four long, slender digits. Body pilose. Air-tube long, gradually tapering, over five times as long as wide; pecten of long teeth, reaching about to basal third, single teeth serrate along one side; six long approximated hair-tufts on posterior margin beyond pecten, progressively decreasing in length towards tip; terminal hooks large, slender, simple. Lateral comb of eighth segment of coarse spines in a rather small patch about two rows deep; single spine elongate, widened at tip, with an apical fringe of spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft of two long hairs and a short one on each side; ventral brush well developed, confined to the barred area. Anal gills shorter than the segment, gradually tapered.

The larvæ live in ground puddles. Mr. Knab obtained them in rock-pools of a stream-bed in a ravine. The larvæ are dark colored and usually lie upon the bottom back downwards, the head bent toward the breast. On his second visit

Digitized by Google

to Córdoba, Mr. Knab found only one larva of this species, and was unable to rear it. The larvæ were comparatively few in numbers and were associated with many larvæ of *Culex coronator*, a few of *Anopheles*, and one of *Lutzia bigotii*. The species appears to have a seasonal occurrence. The pools are flooded during high water and must be pretty thoroughly scoured out during freshets, such as occur in the locality in question.

Mexico.

Córdoba, June 11, 1905 (F. Knab).

CULEX BASTAGARIUS Dyar & Knab.

Culex bastagarius Dyar & Knab, Proc. Biol. Soc. Wash., xix, 170, 1906.

ORIGINAL DESCRIPTION OF CULEX BASTAGARIUS:

Very close to *C. mutator* Dyar & Knab, described from Cordoba, Mexico. The larvae differ slightly. In *mutator* the whole body is densely hairy, the upper head tuft is of three rather long hairs and two of the apical antennal spines are well removed from the tip (Journ. N. Y. Ent. Soc., xiv, pl. x, fig. 42, 1906); in *bastagarius* the thorax only is hairy, the abdomen glabrous, the upper head tuft is of four hairs and very small, the four antennal spines are close together at apex.

The adults of *mutator* were named "*Melanoconion humilis* Theobald" by Mr. Coquillett. *Culex humilis* Theobald (Mon. Culic., ii, 336, 1901), was described from São Paulo, Brazil. We have seen neither adults nor larvæ from Brazil, and, though Theobald's description, as far as it goes, applies to our specimens, the occurrence of closely allied forms in Mexico and Trinidad, prevent us from accepting the name for the form before us.

C. mutator and *C. bastagarius* are practically identical in markings (and agree with Theobald's description of *humilis*), but in *mutator* the upper branch of the fifth vein (♂) has the scales narrowly linear and outstanding, while in *bastagarius* they are narrowly obovate, grading into those of the veins above.

One male, bred from larvæ in small grassy pools as Laventille, Trinidad, by Mr. F. W. Urich. Two other males are in the collection, bred by Mr. A. Busck from unisolated larvae at Arima, Trinidad.

Type.—Cat. No. 10,018, U. S. Nat. Mus.

DESCRIPTION OF MALE AND LARVA OF CULEX BASTAGARIUS (FEMALE UNKNOWN):

Male.—Proboscis long and slender, moderately swollen at tip, clothed with bronzy-black scales. Palpi long and slender, exceeding the proboscis by nearly the length of the last two joints, which, with the end of the long joint, are slightly thickened and clothed with long black hairs; vestiture bronzy brown. Antennæ rather long, densely plumose, hairs of whorls very long. Occiput dark brown, clothed with bronzy-brown scales with a gray luster in some lights, a few narrow, curved ones on the nape, the others broad and flat, many semi-erect, bronzy-brown to golden forked scales; cheeks white scaled.

Mesonotum deep brown, clothed with narrow, curved, pale golden-brown scales, setæ rather sparse, but coarse and long, black. Scutellum trilobate, with a group of long setæ on each lobe, scales similar to those of mesonotum. Postnotum olive brown, nude. Pleuræ dark, coxæ light green, with patches of elliptical, flat white scales and rows of short brown bristles.

Abdomen slender at base, posterior portion depressed and somewhat broadened; vestiture above deep bronzy brown, black in some lights, with white basal bands, first segment unbanded, on second and third segments the bands are nearly obsolete, on fifth and sixth segments reduced to lateral spots; venter dark, with broad, basal, pale segmental bands; lateral ciliation coarse and very long, brown.

Wings rather narrow, vestiture of pale brown scales; scales of veins more dense and ovate on forks of second and fourth veins, outer half of third and apex of upper branch of fifth; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell somewhat shorter than its cell; basal cross-vein about twice its own length from anterior cross-vein.

Digitized by Google

Legs slender, rather long; vestiture deep bronzy brown, black in some lights; femora pale beneath nearly to tips; knees pale. Claw formula, 1.0–1.0–0.0.

Length: Body about 2.5 mm.; wing 2 mm.

Genitalia (plate 13, fig. 88): Side-pieces twice as long as wide, tips conically tapered, outer prominence considerably before apex, partly divided, outer portion broad, short, bearing three rods and a leaf-like appendage, inner longer, slender, bearing two rods with hooked tips; inner prominence before middle, cleft, each division bearing a long rod with hooked tip. Clasp-filament thickened at base and before apex, constricted mesially, tip with a double claw, a row of long setæ before tip. Harpes and harpagones divided into a number of lamellæ, inner branch of harpes long and slender, bent at tip and bearing a row of teeth. Basal appendages approximate, oblique, elliptical, setose.

Larva, Stage IV (plate 108, fig. 364).—Head rounded, wider than long, widest through eyes; antennæ long, rather slender, a large tuft at outer third, part beyond slender; upper pair of dorsal head-hairs multiple, short. Body with skin pilose on thorax, glabrous on abdomen; lateral hairs in threes after second abdominal segment. Lateral comb of eighth segment of many spines in a triangular patch. Air-tube about six times as long as wide, regularly tapering outwardly; pecten of rather long teeth, evenly, closely spaced and reaching basal third; six hair-tufts beyond pecten, in line. Anal segment longer than wide, ringed by the plate, which is spinose on its posterior third; dorsal tuft of two long hairs and a short one on each side; ventral brush well developed, confined to the barred area. Anal gills moderate, ensiform, about as long as the segment, upper pair slightly shorter than lower.

The larvæ live in ground-pools. Mr. Urich obtained them in a small grassy pool.

Island of Trinidad, West Indies.

Laventille (F. W. Urich).

We are uncertain of the identity of the two males mentioned in the original description as having been bred by Mr. Busck, and accordingly at present exclude them from this species.

CULEX FALSIFICATOR Dyar & Knab.

Culex falsificator Dyar & Knab, Smiths. Misc. Colls., quart. iss., lii, 257, 1909.
Culex falsificator Pazos, Sanidad y Ben., ii, 50, 560, 1909.

ORIGINAL DESCRIPTION OF CULEX FALSIFICATOR:

Proboscis black, enlarged towards the apex. Occiput clothed with broad, flat, bronzy black scales, a small area of narrow curved ones behind. Abdomen dull black above with transverse, basal, segmental, dull white bands, beneath yellowish white scaled, the apices of the segments marked with indistinct pale brown bands. Wings with the scales narrowly ovate on the second to fourth veins outwardly. Legs black.

Seven specimens, Havana, Cuba, February 15, 1904 (J. R. Taylor).

Type no. 12108, U. S. N. M.

DESCRIPTION OF FEMALE AND MALE OF CULEX FALSIFICATOR (LARVA UNKNOWN):

Female.—Proboscis rather slender, slightly enlarged towards apex, labellæ conically tapered; vestiture black with a bronzy luster; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, black, one-fifth as long as proboscis, with a few outstanding setæ at base. Antennæ moderate, joints subequal, rugose, pilose, black, second joint a little longer than third; tori subspherical, with a cup-shaped apical excavation, brown; hairs of whorls moderate, sparse, black. Clypeus broadly rounded, convex, brown, nude. Eyes black. Occiput brown, clothed with broad, flat bronzy-black scales with a grayish luster in some lights; a small area with narrow, curved scales on nape; many erect, forked black ones dorsally; flat white scales on the cheeks; a row of black bristles along margins of eyes.

Digitized by Google

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and black bristles. Mesonotum dark brown, clothed with deep bronzy-brown, narrow, curved scales; bristles coarse, black. Scutellum trilobate, luteous, with similar vestiture to mesonotum; each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleurae brownish with dark spots, coxae luteous, with patches of flat white scales and rows of brown bristles.

Abdomen subcylindrical, truncate at tip; dorsal vestiture brownish black, with a series of whitish segmental bands joined to a row of lateral, basal, segmental, triangular, white patches; first segment unbanded; venter pale brownish scaled, with indistinct basal segmental white bands; ends of segments with pale hairs; tip of abdomen bristly.

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein nearly twice its own length distant from anterior cross-vein; scales of veins brown, outstanding ones on second to fourth veins near tip of wing very dense, mostly narrowly ovate. Halteres whitish, with dark knobs.

Legs moderate, black scaled with a bronzy reflection; femora whitish beneath on basal portion. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis long, straight, gradually enlarged to apex; bronzy black. Palpi exceeding the proboscis by more than the length of the last joint; vestiture bronzy brown. Antennae plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at insertions of hair-whorls; hairs long, dense, black. Coloration similar to the female. Abdomen elongate, slender basally, broadened towards apex; dorsal white bands broad and distinct, that on the seventh segment expanded laterally; lateral ciliation coarse, moderately abundant, brown. Wings hardly narrower than in the female, the stems of the fork-cells about the same; vestiture scarcely sparser. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 11, fig. 73): Side-pieces over twice as long as wide, tips conically tapered; lateral process situated near middle, divided, outer branch bearing a leaf-like appendage and two setae, inner also slender, bearing a stout filament at tip and a smaller one near base. Clasp-filament rather small, simple, with an inserted terminal claw. Harpes erect, broad, rather thin, crowned with a comb of fine spines. Harpagones divided, forming two or three pointed, narrow plates. Basal appendages small, rounded, remote, setose.

Life history and habits unknown.

Island of Cuba, West Indies.

Havana, February 15, 1904 (J. R. Taylor).

CULEX MASTIGIA, new species.

DESCRIPTION OF FEMALE AND MALE OF CULEX MASTIGIA (LARVA UNKNOWN):

Female.—Proboscis rather slender, enlarged towards apex, labellae conically tapered; vestiture black with a bronzy luster; setae minute, curved, black, those on labellae more prominently outstanding. Palpi short, black, one-fifth as long as proboscis with a few outstanding setae at base. Antennae moderate, joints subequal, rugose, pilose, black, second joint a little longer than third; tori subspherical, with a cup-shaped apical excavation, brown; hairs of whorls moderate, sparse, black. Clypeus rounded, convex, brown, nude. Eyes black. Occiput brown, clothed with broad, flat bronzy-black scales with a gray or white luster in some lights; a small area of narrow, curved scales on nape; many erect, forked black ones dorsally; flat white scales on the cheeks and narrowly on orbits below; a row of black bristles along margins of eyes.

Digitized by Google

Prothoracic lobes elliptical, remote dorsally, clothed with pale scales and black bristles. Mesonotum dark brown, clothed with bronzy-brown, narrow, curved scales; bristles coarse, black. Scutellum trilobate, luteous, with similar vestiture to mesonotum; each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ brownish with dark spots, coxæ luteous, with patches of flat white scales and rows of brown bristles.

Abdomen subcylindrical, truncate at tip; dorsal vestiture brownish black, with a series of whitish segmental basal bands joined to a row of lateral segmental triangular white patches; first segment unbanded; venter with segments banded black and white, the white bands basal; ends of segments with dark hairs.

Wings moderate, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein nearly twice its own length distant from anterior cross-vein; scales of veins brown, outstanding ones on second to fourth veins near tip of wing very dense, mostly narrowly ovate. Halteres whitish, with dark knobs.

Legs slender, rather long; vestiture black, with a bronzy reflection; femora whitish beneath except at tips. Claw formula, 0.0–0.0–0.0.

Length: Body about 3 mm.; wing 3 mm.

Male.—Proboscis long, straight, gradually enlarged to apex; bronzy black. Palpi exceeding the proboscis by more than the length of the last joint; vestiture bronzy brown. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with thick, black rings at insertions of hair-whorls; hairs long, dense, brown. Coloration similar to the female. Abdomen elongate, broadened towards apex; basal bands moderately broad; ciliation of irregularly placed coarse black bristles. Wings hardly narrower than in the female, the stems of the fork-cells about the same; vestiture somewhat less abundant. Claw formula, 1.0–1.0–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 13, fig. 90): Side-pieces over twice as long as wide, rounded at tips; inner process divided, its distal part bearing four or five setæ, of which the inner ones are stout; proximal part widely furcate, each arm bearing a long filament with slightly expanded bent tip, the inner arm short; clasp-filament with base slightly enlarged, tip expanded, with a central groove, outer apex bearing an area of spines, terminal claw small, stout. Harpes with the inner limb long, slender, bearing a comb of spines at its tip, outer limb obsolete. Harpagones divided into several lamellæ, inner one triply expanded at tip and angled. Unci forming a small basal cone.

Type: No. 12679, U. S. National Museum.

Life history and habits unknown.

Island of Cuba, West Indies.

San Antonio de los Baños (J. H. Pazos); Guanimar (south coast) (J .H. Pazos); ? Havana (J. R. Taylor).

CULEX DECORATOR Dyar & Knab.

Culex decorator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 218, 1906.

ORIGINAL DESCRIPTION OF CULEX DECORATOR:

Antennæ with the tuft beyond the outer third, dark; head hairs, the upper tuft triple, the lower single; lateral hairs double on the second segment, in threes on the third to fifth, in twos and much longer on the sixth. Air tube 7 × 1, the pecten not reaching one-third, short. Anal gills short.

Collected by Mr. Busck on Tobago Island, the larvæ in bamboo joints. They were brought to Washington alive, but failed to mature.

Digitized by Google

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent	18
18.	Air tube without a crown of spikes, smooth throughout	19
19.	Air tube with long well-defined tufts	20
20.	Body glabrous or lightly granular	26
26.	Air tube regularly tapered, the tip not widened	28
28.	Upper head hair triple, lower single	*decorator*

DESCRIPTION OF LARVA OF CULEX DECORATOR (ADULT UNKNOWN):

Larva, Stage IV (see figure of the entire larva, plate 56).—Head subquadrate, broad, widest through eyes, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, thick and spined on basal two-thirds, with a large tuft from a notch; two long setæ almost at tip, a long seta, a short one and a digit at tip. Upper pair of dorsal head-hairs in threes, lower pair single; ante-antennal tufts multiple. Mandible quadrangular; two long filaments and a short one before tip; an outer row of cilia from a collar; a dense row of transverse rounded prominences just within outer margin, each bearing a long, slender hair and tuft of short ones; dentition of two long teeth on a process with some short spines below; a spine before, two teeth at base, a long smooth filament, a row of feathered hairs within; process below shallowly furcate, with a short transverse and longitudinal row of hairs and tuft at tip; basal angle moderate, with a row of stout hairs within; a row of long hairs at base. Maxilla elongate, bluntly rounded at tip, divided by a suture; inner half with a row of long spines on margin, basal ones feathered; two rows of cilia at base and a patch of short spines beyond; a stout articulated spine at outer third; a tuft of long hairs at tip running down along the suture; outer half with two short filaments near middle. Palpus very small, with four long, straight terminal digits. Mental plate rather small, triangular, with a large thick central tooth and six on each side, first four closely spaced, fifth somewhat projecting and separate, sixth small. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral abdominal hairs in threes on first segment, in twos on second, in threes but short on third to fifth, double and long on sixth; skin smooth; tracheæ slender. Air-tube long and straight, very slightly tapered, over seven times as long as wide; pecten reaching about one-fourth, single teeth short, coarsely serrate on one side; four tufts on posterior margin beyond pecten, decreasing in length towards tip. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at tip, with an apical fringe of spinules. Anal segment about twice as long as wide, ringed by the plate; dorsal tuft of two long and two short hairs on each side; ventral brush well developed, confined to barred area. Anal gills very small, not half as long as the segment, tapered.

The larvæ were found in water in a bamboo-joint.

Tobago Island, near Trinidad, West Indies, May, 1905 (A. Busck).

Mr. Busck obtained no adults of *Culex decorator*, and we have not since received it.

CULEX NIGRIPALPUS Theobald.

Culex nigripalpus Theobald, Mon. Culic., ii, 322, 1901.
Culex nigripalpis Giles, Gnats or Mosq., 2 ed., 468, 1902.
Culex nigripalpus Theobald, Mon. Culic., iii, 221, 1903.
Culex nigripalpis Blanchard, Les Moustiques, 328, 1905.
Melanoconion nigripalpus Theobald, Genera Ins., Dipt., fasc. 26, 32, 1905.

Digitized by Google

ORIGINAL DESCRIPTION OF CULEX NIGRIPALPUS:

Head grey; thorax chestnut-brown; abdomen almost black, unbanded, grey ventrally; proboscis almost black; palpi longer than proboscis, black, last two joints with black hairs, acuminate; legs dark brown, unbanded.

♂. Head dark brown, the middle clothed with very small narrow golden curved scales, the sides with flat greyish scales, which extend some way each side on to the occiput; there are also numerous small black upright forked scales on the back of the mid area down to the nape; antennae brown, with grey bands and dark brown to almost black plumes; proboscis black, testaceous at the apex; palpi longer than the proboscis by nearly the whole of the last two joints, there are traces of a pale band near the base of the antepenultimate joint, the penultimate joint a little longer than the apical joint, minutely testaceous at the base, apical joint acuminate; the last two joints with stiff black hairs, and the apex of the antepenultimate with two thick bristles.

Thorax deep clear chestnut brown, with very small narrow curved dull fawn-coloured scales and with black bristles, especially long over the roots of the wings; scutellum pale ochraceous to greyish-brown with small curved pale dull brown scales and long brown border-bristles, six in number to the mid lobe; metanotum brown; pleurae pale brown.

Abdomen covered with deep brown scales dorsally, with violet reflections, venter pale, covered with grey scales; on the last segment are some grey scales also dorsal; genitalia ochraceous; border-bristles rather pale.

Legs dark brown, the femora grayish beneath; fore ungues unequal, rather straight, the larger one uniserrated, the smaller (apparently) simple; mid ungues unequal, very similar to the fore; hind ones minute, equal, and simple.

Wings with brown scales, the median ones rather thick and short and dense, especially on the fork-cells, but also with longish, nearly straight lateral scales, the scales on the sub-costal and first long vein darker and very dense, those forming the upper border of the wing black and lanceolate; the first sub-marginal cell a little longer and narrower than the second posterior cell, its base nearer the base of the wing than that of the latter, its stem equal to about one-fourth of the length of the cell, considerably shorter than that of the second posterior cell, which is equal to about two-thirds of the length of the cell; posterior cross-vein more than twice its own length distant from the mid cross-vein; fringe dark brown.

Length.—2.5 mm.

Habitat.—St. Lucia (Dr. Low).

Observations.—Described from a single ♂ in perfect condition. It can at once be told by the dark pointed palpi and unbanded abdomen from any other of the related species. The head ornamentation is very peculiar and marked. The lateral flat grey scales show very clearly against the brown thorax. No note of any kind sent with the specimen.

We have not recognized this species in the material before us.

The larva is unknown. According to Theobald Dr. Low bred the adults from larvæ found in a pool, where they were associated with the larvæ of *Uranotaenia lowii* and *Anopheles*.

Lesser Antilles.

Island of Santa Lucia, West Indies (Theobald).

Theobald later recorded a single male from the island of Barbados, but we are inclined to doubt the identification.

CULEX SUBFUSCUS Theobald.

Culex subfuscus Theobald, Mon. Culic., iv, 403, 1907.
Culex subfuscus Theobald, Mon. Culic., v, 365, 1910.

ORIGINAL DESCRIPTION OF CULEX SUBFUSCUS:

Head brown, with pale scales, paler at the sides; palpi of male deep brown, a narrow pale band at the junction of the two apical segments, and the antepenultimate and a narrow one on the antepenultimate segment; hair-tufts brown and flaxen; proboscis with a pale band. Thorax rich brown, unadorned; scutellum paler. Abdomen deep brown, with basal pale bands. Legs deep brown, with very narrow apical pale bands. Apical segment of palpi longer than the penultimate.

♂. Head deep brown, with scanty narrow-curved pale creamy scales and brown upright forked scales, sides with flat creamy scales. Palpi deep brown, the apical segment longer than the penultimate, both with lateral deep brown (flaxen in some lights) hair-tufts, and a narrow pale band at the junction of the first two segments

Digitized by Google

and at the junction of the penultimate and antepenultimate, also a narrow pale band on the long antepenultimate segment, which has long hairs on one side of its apex for some little distance; proboscis deep brown with a narrow pale band.

Thorax deep brown with narrow-curved rich brown scales, and three prominent double rows of bright brown chætæ and others at the sides, a few paler scales behind and over the roots of the wings; scutellum pale brown with narrow-curved pale creamy scales and eight bright brown to black posterior border-bristles and some smaller paler ones; metanotum deep brown.

Abdomen deep brown, basal segment brown, with two dark patches of scales, second segment with a median basal creamy spot, other segments with basal creamy bands, pallid border-bristles and brown lateral ones.

Legs deep brown, femora pale beneath, knee spot creamy white, all the tarsal segments except the last with small apical creamy spots or bands; fore and mid ungues unequal, both uniserrate (?), hind small equal and simple.

Wings with short fork-cells, their bases about level, the first sub-marginal longer and narrower than the second posterior, the stems nearly as long as the cells; posterior cross-vein about twice its own length distant from the mid.

Male genitalia with the claspers fairly broad, not much curved, a small thin expanding lateral apical segment; lateral process of basal lobe with three large flat spines, the median one broadest and curved hook-like apically, the basal one the smallest, foliate plate rather short and broad; setaceous lobes large and prominent with many large broad spines and two broad flattish processes beneath them; basal lobes with very long chætæ.

Length.—5 mm.

Habitat.—Moncague, Jamaica (Lord Walsingham).

Time of capture.—February.

Observations.—Described from a single ♂. The genitalia mounted in balsam. It comes near *C. secutor* and allies in general appearance, but may at once be told by the apical segment of the palpi being longer than the penultimate, by the narrow apical leg bands, and by the genitalia and unadorned thorax. The female is at present unknown.

We have been unable to recognize this species.

The larva is unknown and the life history and habits are unknown.

Island of Jamaica, West Indies.

Culex subfuscus is described from a single male specimen and no characters which we consider distinctive are mentioned; we find it impossible to identify it under the circumstances. When the male genitalia shall have been properly elucidated it may be possible to identify it; until then we are obliged to list it as unrecognizable.

CULEX IMITATOR Theobald.

Culex imitator Theobald, Mon. Culicid., iii, 175, 1903.
Culex imitator Lutz in Bourroul, Mosq. do Brasil, 43, 72, 76, 1904.
Culex confirmatus Goeldi (in part, not Arribálzaga), Os Mosq. no Pará, 93–95, pl. C, figs. 32, 33, 1905.
Culex imitator Blanchard, Les Moustiques, 628, 1905.
Culex daumasturus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 220, 1906.
Culex vector Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 220, 1906.
Culex daumasturus Dyar, Proc. Ent. Soc. Wash., viii, 17, 1906.
Culex imitator Dyar & Knab, Proc. Biol. Soc. Wash., xix, 170, 1906.
Culex vector Knab, Psyche, xiii, 97, 1906.
Grabhamia imitator Coquillett, U. S. Dept Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Microculex argenteoumbrosus Theobald, Mon. Culicid., iv, 461, 1907.
Culex imitator Peryassú, Os Culicideos do Brazil, 196, 1908.
Microculex argenteoumbrosus Peryassú, os Culicideos do Brasil, 213, 1908.
Culex imitator, var. *vector* Dyar & Knab, Smiths. Misc. Colls., quart. iss., iii, 255, 1909.
Culex imitator Theobald, Mon. Culic., v, 327, 345, 1910.
Microculex argenteoumbrosus Theobald, Mon. Culic., v, 400, 1910.

ORIGINAL DESCRIPTION OF CULEX IMITATOR:

Head with silvery-white narrow-curved scales, thorax brown, ornamented with narrow-curved, bright chestnut-brown and silvery scales, as follows: chestnut-brown in the middle, with two narrow parallel silvery lines in front, formed by two narrow white-scaled lines on the sides of two bare parallel lines, a few pale scales forming a short indistinct third line between and a few white scales behind; sides densely

Digitized by Google

silvery-white scaled. Abdomen deep brown, with basal white bands, expanding laterally into basal white spots. Fore and mid legs unbanded, hind with broad basal white bands.

♂. Head brown, covered with silvery-white narrow-curved scales on the occiput, with a dividing line in the middle, the scales turning outwards on each side from this line, sides of the head covered with small flat white, then flat dusky scales. Proboscis dark brown, almost black, slightly expanded apically; palpi as long as the proboscis, black scaled, with four white bands, the bands being on the basal part of the joints; the apical joint slightly shorter than the penultimate, both with a few long black bristles, base of palpi white. Antennæ brown, with brown plumes.

Thorax brown, ornamented with small, bright, chestnut-brown and silvery, narrow-curved scales, as follows: Bright chestnut-brown in the middle, with two parallel bare lines and a narrow border of white scales on each side of the bare lines in front, a few white scales in the middle in front, pure silvery white at the sides of the mesothorax and scattered white scales at the back; bristles brown, longish, thick over the roots of the wings; scutellum testaceous brown, covered with narrow-curved white scales and with six brown border-bristles to the mid lobe; metanotum brown; pleuræ pallid.

Abdomen deep brown to black, with basal white bands, which spread out laterally to form basal white spots, last segment with all dull white scales, hairy; border-bristles short in the middle of the segments. Legs dark brown, femora pallid beneath, the fore and mid unbanded, the hind with broad basal white bands on the metatarsi and tarsi; the fore legs have an apical white spot on the femora and tibiæ; the mid have an apical white femoral and tibial spot and a small basal white spot, almost a band on the metatarsi; fore and mid claws unequal, hind equal; the fore claws both uniserrated; the larger one of the mid very narrow and fragile, with a very thin curved tooth on its basal half; (smaller tooth?).

Wings with typical *Culex* scales; fork-cells of moderate size, first sub-marginal longer and narrower than the second posterior cell, its base nearer the base of the wing, its stem less than half the length of the cell; stem of the second posterior cell nearly as long as the cell; posterior cross-vein at least three times its own length distant from the mid cross-vein. Halteres with pale ochraceous stem and pale brown knob.

Length.—3 mm.

Habitat.—Brazil (Dr. Lutz).

Observations.—Described from a single perfect male. It is a very distinct species, resembling at first sight *Stegomyia fasciata*, but easily distinguished by the absence of banding on the fore and mid legs, but especially by the scale structure, which shows it to be a typical *Culex*, the scales of the head and scutellum being narrow-curved ones, not flat as in the genus *Stegomyia*.

Dr. Lutz sent me this specimen, stating it to be a "bromelia feeder."

ORIGINAL DESCRIPTION OF CULEX DAUMASTURUS:

Distinct from any known larva by the very long air tube (12 × 1) with a swelling at the outer third.

It was collected by Mr. Busck in the leaf corner of a Century Plant near the pitch lake, La Brea, Trinidad. A second specimen has been sent us by Mr. Urich from Bromelias at Arima, Trinidad. The adult was named "*Culex imitator* Theob." by Mr. Coquillett, and it may be that species, which was bred from Bromelia water by Dr. Lutz in Brazil; but we do not feel certain enough of it to accept the name.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender..	5
5.	Air tube four times as long as wide or over.....	7
7.	Anal appendages four, normal.....	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout.....	19
19.	Air tube with small double or single hairs, or bare.....	31
31.	Air tube very long with a swelling at outer fourth.....	*daumasturus*

ORIGINAL DESCRIPTION OF CULEX VECTOR:

Antennæ with the tuft at the outer third, pale; body glabrous; lateral abdominal hairs in four on first segment, twos on second, fours on third to fifth, single and long on the sixth. Air tube 9 × 1, wide at base, the pecten sparse and long, reaching to one-fourth, followed by a little double-haired tuft. Lateral comb of the eighth segment a large patch of long spines. Anal gills moderate, pointed.

Digitized by Google

Collected by Mr. Urich in Trinidad from Bromelia water. It was named by Mr. Coquillett "*Culex varipalpus* Coq." but on our remonstrating with him, it was changed to "*Culex imitator* Theob." We cannot adopt this name, either. (See remark under the preceding species.)

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent	18
18.	Air tube without a crown of spikes, smooth throughout	19
19.	Air tube with small double or single hairs, or bare	31
31.	Air tube uniform, without any swelling	32
32.	Air tube with slight tufts	33
33.	Pecten of the air tube reaching one-fourth or less	35
35.	Pecten sparse and long	36
36.	Lateral hairs in fours after the second segment; comb of shorter spines and more rows deep	*vector*

ORIGINAL DESCRIPTION OF MICROCULEX ARGENTEOUMBROSUS:

Head silvery grey; proboscis unbanded. Thorax rich brown in the middle, silvery at the sides, in front and behind. Abdomen deep brown, with small basal white median and lateral spots. Hind legs with pronounced white basal bands, just traces on the fore and mid legs. Male palpi deep brown, acuminate with three prominent white bands; no hair-tufts.

♀. Head deep brown, almost black, clothed with rather long narrow-curved silvery grey scales and flat similar coloured lateral ones, some ochreous upright forked scales behind, the whole head somewhat ragged. Palpi, proboscis and antennæ deep brown.

Thorax black, clothed in the middle with small, narrow-curved bright bronzy-brown scales, around this area larger silvery white scales forming a broad area in front, also at the sides and just before the scutellum, where they surround the bare space; scutellum brown, with silvery-grey narrow-curved scales; four black bristles to the posterior border of the mid lobe and numerous long ones over the roots of the wings; metanotum deep brown; pleuræ pale brown and grey.

Abdomen deep blackish-brown, with a small median basal pale spot and white lateral basal spots; posterior border-bristles rather pale, short, but a long one on each side; venter with broad basal white bands.

Legs deep brown; coxæ and femora at base and beneath pale; in the fore legs the apex of the femora and tibiæ are white, in the mid legs there is a basal white band to the first tarsal, and the next two tarsals have very narrow bands; in the hind legs there is a broad band to all the segments, the hind tarsal being nearly all white; femora, tibiæ and first tarsals spinose; ungues equal and simple; the white apices of the femora and tibiae are rather more densely scaled than the rest, so look swollen.

Wings with the first sub-marginal cell much longer, but very little narrower than the second posterior cell, its base nearer the base of the wing, its stem about one-third the length of the cell, stem of the second posterior about two-thirds the length of the cell; posterior cross-vein longer than the mid, about one and three-fourths its own length distant from it; stem and lower branch of the fifth long vein with a double row of rather long median vein scales; outer border of costa spinose.

Length.—2 mm.

♂. Head as in ♀, but with more forked scales; palpi thin, deep brown, with three white bands, one at the base of the last two segments and a broader one on the antepenultimate, the last segment shorter than the penultimate, the apical one, bluntly acuminate, ending with a few spines, no lateral hairs, a few long hairs on the penultimate; proboscis thin, much expanded apically. Antennæ plumose. Thorax as in ♀, but with longer black bristles. The abdomen with basal white bands. Basal segment of the genitalia, with a prominent lateral lobe, with thin long chitinous flat bristles, becoming almost hair-like at the apex and curved; the claspers rather short and broad, with the lateral terminal segment slightly clavate and passing beyond the apex of the clasper.

Fore and mid ungues unequal, both uniserrate, the larger with a long curved basal *lateral* tooth; hind equal and simple.

Wings with the scales broader than in the ♀, especially on the apical parts of the veins; first sub-marginal cell much longer and slightly narrower than the second posterior cell, its base nearer the base of the wing than that of the second posterior cell.

Digitized by Google

its stem less than one-third the length of the cell; stem of the second posterior cell not quite as long as the cell; posterior cross-vein not quite twice its own length distant from the mid.

Length.—2.5 mm.

Habitat.—Rio Janeiro (Professor Goeldi).

Time of capture.—April.

Observations.—Described from two ♀'s and two ♂'s. It is a very pretty small species, easily told by the thoracic adornment. The ♂ palpi differ from *Culex* proper, and there are some differences in wing scales and in general appearance. This small stout gnat is totally different from any member of that genus.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX IMITATOR:

Female.—Proboscis rather long, slender, apical third thickened; labellæ conically tapered; vestiture black with a blue reflection towards tip; setæ minute, curved black, those on labellæ more prominently outstanding. Palpi short, black, one-sixth as long as proboscis, with some outstanding setæ at base. Antennæ moderate, joints subequal, rugose, pilose, black, second joint scarcely enlarged; tori subspherical, with a cup-shaped apical excavation, pale yellowish; hairs of whorls sparse, black and rather short. Clypeus broad, rounded, convex, dark brown. Eyes black. Occiput black, clothed with narrow, curved silvery scales, numerous erect forked yellowish scales; cheeks clothed with broad, flat, dull white scales; coarse black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow, curved silvery-white scales and a few black bristles. Mesonotum brown with two narrow bare impressed lines, vestiture of dense, narrow curved scales, bright shining brown on the disk, very broadly silvery white scaled on the lateral and anterior margins and in a large spot on each side of the middle and joined to the lateral margins, as well as a broad border of silvery scales at the sides of the antescutellar space; bristles black, long. Scutellum trilobate, pale, clothed with narrow silvery scales, each lobe with a group of black bristles. Postnotum elliptical, luteous brown, nude. Pleuræ luteous and whitish, a dark spot beneath wings and a dark band above base of coxæ; small patches of elliptical, flat white scales.

Abdomen subcylindrical, depressed, truncate at tip, clothed dorsally with black scales with a strong coppery metallic reflection, a series of narrow, white, basal, segmental bands or spots, becoming obsolete towards base and apex or altogether absent; a row of lateral, white, basal, segmental spots; venter clothed with yellowish-white scales and with narrow black bands at tips of segments.

Wings ample, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell about equal to its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins brown, long, linear, not very dense. Halteres white, with a black knob.

Legs slender, rather long; femora black above, white beneath nearly to apex, tips silvery white; tibiæ black above, whitish beneath, a small silvery spot at base and tip above; tarsi black with basal white rings on the joints, obsolete on the front tarsi, narrow on the median pair and with the last joint all black, broad on the hind tarsi, the fourth joint with the basal half white, the fifth white and its tip black. Claw formula, 0.0–0.0–0.0.

Length: Body about 2 mm.; wing 2.5 mm.

Male.—Palpi as long as the proboscis, slender, uniform, the last joint not tapered; vestiture black with a broad white ring at base of last two joints and at the middle of the long joint, a few short black hairs on last two joints and tip of long joint. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with a black ring at insertions of hair-whorls; hairs long, dense, brown. Coloration similar to the female. Abdomen elongate, depressed on apical half, the fifth and sixth segments laterally ex-

Digitized by Google

panded; dorsal white bands somewhat broader and present on all the segments; lateral ciliation sparse but rather coarse, pale brown. On the mesonotum the markings sometimes differ from those of the female, the silvery scales being continued across the middle of the disk. Fore tarsi with a silvery spot at base of the second joint in some specimens. Wings much narrower than in the female, the stems of the fork-cells longer, vestiture sparse. Claw formula, 1.1–1.1–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Genitalia (plate 8, fig. 56): Side-pieces twice as long as wide, tips conically tapered, a subapical rounded prominence bearing setæ only, preceded about middle of side-piece by two rods with curved tips on separate peduncles; clasp-filament small, slender with an articulated terminal spine. Harpes with a slender branch, curved at tip, bearing a row of five teeth.

Larva, Stage IV (plate 111, fig. 376).—Head rounded, widest through eyes, a large notch at insertion of antennæ, front margin roundedly angled, with an excavation between clypeal spines. Antennæ rather large, sparsely spined at base, a large tuft at outer third which is without a distinct notch; three long setæ, a short one and a long digit at tip. Mental plate triangular, with a stout central tooth and seven on each side, basal ones a little larger and more remotely placed, last one minute or rudimentary. Mandible triangular, outer basal angle produced into a rounded lobe directed basally; three filaments and a tuft of hairs before tip; an outer row of cilia from a collar; a row of rounded conical prominences on outer margin, each bearing a tuft of plumose hairs; dentition of a single tooth on a process with a row of short, thick spines below; a spine before, a long smooth filament and a row of feathered hairs within; process below curved basally, widely furcate, upper limb short and rounded, a longitudinal row of hairs and a tuft at tip of each limb; basal angle absent, a row of hairs within; a row of hairs at base. Maxilla elongate, truncately rounded at tip, evenly divided by the suture; inner half with very long spines on margin and two shorter rows of spines within; a long spine at outer third; a row of long hairs at tip running down along suture; outer half with two slender filaments at basal third. Palpus small and slender, with four long straight digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral abdominal hairs in fours on first segment, in twos on second, in fours on third to fifth, a single long hair on sixth; skin glabrous. Air-tube very long and slender, slightly tapering at base, nine times as long as wide; with or without a rounded swelling at outer third; pecten of long sparse spines, running to basal fourth, simple, unbranched; four small hair-tufts beyond. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at the tip, with an apical fringe of spinules. Anal segment longer than wide, ringed by the plate; dorsal tuft of two long hairs on each side; ventral brush well developed, confined to the barred area. Anal gills about as long as anal segment, regularly tapered.

The larvæ live in the water at the bases of the leaves of epiphytic or terrestrial Bromeliaceæ and in similar locations. Peryassú records the adults as taken from January to June (Rio de Janeiro).

Panama to Trinidad and Brazil.

Fort San Felipe, Porto Bello Bay, Panama, January 3, 1908 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, January 20, 1908 (A. H. Jennings); Trinidad (F. W. Urich); La Brea, Trinidad, July 8, 1905 (A. Busck); São Paulo, Brazil (A. Lutz). The species is reported also from Pará (Goeldi), Bahia (Bourroul), states of Rio de Janeiro and Minas Geraes, Brazil (Peryassú).

Digitized by Google

Culex imitator was first described by Theobald in the genus *Culex,* but later he redescribed it as a new genus and species. Both the names are used by Peryassú, who simply translated Theobald's descriptions, without observing the synonymy. We do not consider the species as deserving of generic rank, yet it is typical of the peculiar bromelia-feeding forms of *Culex* with very long air-tubes in the larva. These probably all deposit their eggs in a mass of jelly, as at least one of them (*Culex jenningsi*) does; they undoubtedly represent a distinct group, but this intergrades with the more typical *Culex,* so that Theobald's name *Microculex* can not be safely employed.

The adults show great variation in the scale ornamentation, as indicated by the following table of varieties. In the specimens in which the mesonotal silvery ornamentation is obsolete, the tarsal white bands are much narrowed, half or more of the last hind tarsal being black. In males with reduced markings, the palpi are entirely black, and the dorsum of the abdomen shows only white lateral spots.

The larvæ of *Culex imitator* are subject to a peculiar modification in the shape of the breathing-tube, which is varietal only, but for which a separate name has been proposed. We have thought it desirable to employ the name *daumasturus* for the form of the larva with a swelling on the tube. This swelling varies in size, form and position in different individuals and may be absent altogether in specimens of the same brood.

TABLE OF VARIETIES.

ADULTS.

Thorax adorned with silvery markings..... *imitator* Theobald
Thorax without silvery markings..... *vector* Dyar & Knab

LARVÆ.

Air tube long, straight, uniform..... *imitator* Theobald
Air tube with a central fusiform enlargement.. *daumasturus* Dyar & Knab

Goeldi figures the larva and pupa of this species under the name *Culex confirmatus,* under a misidentification of Arribálzaga's species; the figures given by this author of the eggs (Os Mosquitos no Pará, 1905, pl. C, figs. 29–31) and the female imago (pl. iv, fig. 17) really represent *Aëdes scapularis.*

CULEX DAUMASTOCAMPA Dyar & Knab.

Culex daumastocampa Dyar & Knab, Proc. U. S. Nat. Mus., xxxv, 58, 1908.
Culex daumastocampa Theobald, Mon. Culic., v, 615, 1910.

ORIGINAL DESCRIPTION OF CULEX DAUMASTOCAMPA:

Female.—Proboscis long and slender, swollen at the apex; palpi black-scaled; occiput golden-scaled, with black scales sparsely intermixed, a large dark spot on each side; thorax deep brown scaled, the front and lateral margins on the anterior half very broadly bright golden-scaled; scutellum dark-scaled; abdomen dark-scaled above, with bronzy luster, slightly lighter colored beneath, but without distinct banding; scales along the wing veins long and narrow, darkly colored; legs dark-scaled, with bronzy luster; hind legs with the under surface of the femora silvery white-scaled, the apices of the tibiae and a rather broad ring at the base of the first tarsal joint silvery white-scaled; second and third tarsal joints very narrowly silver-white-ringed at the bases, the rings obsolete on the fourth and fifth joints; front and middle legs without rings; tarsal claws simple. Length, 2 mm.

Male.—Palpi long and slender, nearly as long as the proboscis, black-scaled, without annulations; head and thoracic markings as in the female; abdomen dark-scaled above, with strong coppery luster; beneath the scaling is more brassy, but there are no segmental bands; knees of the hind legs silvery scaled; tibial and tarsal markings as in the female. Length 2 mm.

Three specimens, Porto Bello, Fort San Felipe, Panama, bred from larvae in water between the leaves of bromeliaceous plants. (A. H. Jennings.)

Type.—Cat. No. 11967, U. S. N. M.

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX DAUMASTOCAMPA:

Female.—Proboscis long and slender, swollen towards tip, labellæ conically tapered; vestiture black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, black, about one-sixth as long as proboscis, with some outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, black, second joint slightly enlarged; tori subspherical, with a cup-shaped apical excavation, ochraceous; hairs of whorls sparse, long, black. Clypeus conical, convex, brown, nude. Eyes black. Occiput brown, clothed with narrow, curved scales on the vertex, flat ones on the sides, golden on the vertex with black scales sparsely interspersed, a large patch of broad, flat, black scales on each side, ocular margin and cheeks white scaled; many erect, forked pale yellowish scales dorsally.

Prothoracic lobes elliptical, remote dorsally, rather prominent, clothed with pale hairs. Mesonotum yellow brown, with two rather broad impressed bare lines and a narrow median one, vestiture of coarse, narrow, curved scales, blackish brown on the disk, broadly golden in front and over anterior angles and continued along the sides about halfway to base of wing; bristles black and coarse. Scutellum trilobate, luteous, clothed with narrow, curved blackish-brown scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, pale ochraceous, nude, a median, somewhat darker longitudinal ridge. Pleuræ pale greenish yellow, with a transverse brownish band, coxæ pale yellowish, with rows of short pale bristles.

Abdomen subcylindrical, depressed, truncate at tip, clothed dorsally with black scales with a bronzy luster; ventral vestiture paler, without distinct banding.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell; that of second posterior cell shorter than its cell; basal cross-vein about its own length distant from anterior cross-vein; scales of veins brown, those on the costa darker, outstanding ones narrowly ligulate. Halteres pale.

Legs long and slender; femora bronzy brown, the hind pair pale with a brassy luster, dark at tips, the knees white scaled; tibiæ and tarsi black with a bronzy luster, hind tibiæ with the scales roughened and the apices broadly white, hind tarsi with the first, second, and third joints with a narrow basal white ring, fourth and fifth joints and all of fore and mid tarsi without white rings. Claw formula, 0.0–0.0–0.0.

Length: Body about 2 mm.; wing 2.2 mm.

Male.—Palpi nearly as long as proboscis, slender, uniform, apices blunt, with some long setæ; vestiture black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, stout, whitish, with black rings at insertions of hair-whorls; hairs long, brown, rather dense. Coloration similar to the female. Wings scarcely narrower than in the female, the stems of the fork-cells about the same, basal cross-vein far removed from anterior cross-vein, vestiture about as in the female. Abdomen with the hairs rather coarse, irregularly placed, pale. Claw formula 1.0–1.0–0.0.

Length: Body about 2 mm.; wing 2 mm.

Genitalia (plate 9, fig. 63): Side-pieces over twice as long as wide, tips conically tapered; inner lobe double, outer part low, quadrate, bearing five setæ, inner part well removed, a pointed rod on a pedicle and three smaller ones from a slight subquadrate elevation; clasp-filament long, slender, attenuated mesially, with a subapical claw. Harpes divided, inner limb long, slender, terminating in a slender comb. Harpagones lamelliform, inner angles doubly bent and rounded.

Larva, Stage IV (plate 109, fig. 366).—Head wider than long, strongly bulging at eyes, front margin somewhat prominent, medianly truncate; antennæ

Digitized by Google

short, very stout, the tuft at outer third and arising from a notch, the terminal setæ short; upper pair of dorsal head-hairs in fours, lower pair single; ante-antennal tuft multiple. Body with skin smooth. Lateral comb of eighth segment of many spines in a patch, the last row of large coarse ones, the others minute. Air-tube about six times as long as basal width, stout on basal third, slender and uniform beyond; pecten on basal third of tube, of long spines, exceeding diameter of tube at the middle; four tufts in line on outer half of tube, equally spaced; terminal hooks very long, curved, simple. Anal segment longer than wide, ringed by the plate; dorsal tuft of two long hairs on each side; ventral brush confined by the chitinous ring. Anal gills small, tapering, shorter than the segment.

Mr. Jennings bred the specimens from a mixed lot of larvæ taken from water between the leaves of Bromeliaceæ.

Panama.

Fort San Felipe, Porto Bello Bay, January 21, 1908, February 10, 1909 (A. H. Jennings); Upper Pequini River, March 25, 1909, from bromelias on a tree at Survey Camp No. 3 (A. H. Jennings).

CULEX PLEURISTRIATUS Theobald.

Culex pleuristriatus Theobald, Mon. Culic., iii, 177, 1903.
Culex pleuristriatus Lutz in Bourroul. Mosq. do Brasil, 43, 72, 1904.
Culex pleuristriatus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 205, 209, 1906.
Culex pleuristriatus Peryassú, Os Culicid. do Brazil, 192, 1908.
Culex pleuristriatus Theobald, Mon. Culic., v, 345, 1910.

ORIGINAL DESCRIPTION OF CULEX PLEURISTRIATUS:

Thorax rich brown, ornamented with creamy golden and black scales; pleurae very pale, with two broken parallel brown lines. Abdomen deep brown, with basal lateral white spots. Proboscis black, unbanded. Legs deep brown, the fore unbanded, the mid and the hind with very narrow pale basal bands.

♀. Head ornamented, with narrow-curved silvery-white scales on the crown and front, the sides with flat white, and then flat ochraceous and brown scales, the upright forked scales in the middle are bright ochraceous, with a patch of jet black ones on each side; palpi, proboscis and antennae black.

Thorax brown, ornamented with creamy, golden and black narrow-curved scales as follows: The creamy ones forming a line on each side in front and a patch in front of the bare space in front of the scutellum and on each side of it; the golden scales form more or less a median area anteriorly, the spaces between which are rich brown, having small jet-black curved scales; scutellum brown, with narrow-curved pale scales and a few black ones; six border-bristles to the mid lobe; metanotum brown; pleurae pallid grey, with a broad dark line over the base of the legs and another more irregular one above it; there are also grey flat scales on the pleurae.

Abdomen black, the first segment nude, with two patches of black scales, the second segment with a median basal white patch, the third unadorned, the next four with basal lateral white spots, which in some specimens spread out and almost form narrow bands; border-bristles pale golden; the fourth segment has a median pale bristle; in one specimen the first, second and third segments have median white spots; venter brown, with basal white ornamentation; legs deep blackish-brown, with the coxae very pale grey; the fore legs usually unbanded, the mid and the hind have narrow white basal bands to some or all of the tarsi and metatarsi; ungues small, equal and simple.

Wings with the veins clothed with typical *Culex* scales; the first sub-marginal cell longer and narrower than the second posterior cell, its base much nearer the base of the wing than that of the latter; stem of the first sub-marginal very short, of the second posterior nearly as long as the cell; posterior cross-vein about three times its own length distant from the mid cross-vein. Halteres with grey stem, with a black streak at the "elbow" and a black knob.

Length.—4 mm.

Habitat.—Sao Paulo, Brazil (Dr. Lutz).

Observations.—Described from some specimens sent me by Dr. Lutz, who proposed the name I have adopted. It seems to vary considerably. I think it comes well in the genus *Culex*, although the wing scales are dense apically, giving it the appearance of a *Melanoconops*. The cephalic ornamentation is very marked.

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX PLEUROSTRIATUS:

Female.—Proboscis long and slender, thickened towards apex, labellæ conically tapered; vestiture black; setæ minute, curved black, those on labellæ more prominently outstanding. Palpi short, black, one-fifth as long as proboscis, with some outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, black, second joint scarcely enlarged; tori subspherical, with a cup-shaped apical excavation, pale luteous; hairs of whorls sparse, black and rather short. Clypeus small, rounded convex, brown, nude. Eyes black. Occiput black, clothed with narrow, curved pale ochraceous yellow shining scales, margins of eyes pale; numerous erect, forked yellowish scales dorsally, a patch of broad flat black scales on either side; cheeks narrow, clothed with flat white scales.

Prothoracic lobes elliptical, remote dorsally, clothed with narrow, curved pale yellowish scales and a few brown bristles. Mesonotum blackish brown, with two bare, narrow impressed longitudinal lines; vestiture of rather coarse and dense, narrow curved scales, shining yellowish intermixed with deep brown ones, the latter forming seven ill-defined patches, two spots before and above the lateral depression on each side, a single patch before ante-scutellar space, an elongate spot basally on each side above roots of wings; bristles black, long. Scutellum trilobate, dark brown, clothed with narrow, curved golden ochraceous scales, each lobe with a group of black bristles. Postnotum elliptical, blackish, nude. Pleuræ greenish luteous, a dark transverse band beneath wings and another above base of coxæ; two small patches of elliptical, flat white scales; coxæ pale greenish, fore coxæ with a patch of black scales on outer side.

Abdomen subcylindrical, depressed, truncate at tip, clothed dorsally with black scales with a slight metallic reflection, a series of narrow white basal segmental bands, joining a row of lateral triangular basal segmental white spots; first segment with a dorsal patch of black scales; venter clothed with yellowish-white scales and rather narrow black bands at tips of segments.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins bronzy black, narrowly ligulate, becoming somewhat denser apically. Halteres white, with black knobs.

Legs slender, rather long; femora black above, white beneath nearly to apex, tips narrowly white; tibiæ black with a blue reflection, tips narrowly whitish; tarsi black, hind pair with small basal white rings on the joints, occupying basal fourth on last joint, obsolete on fore tarsi, the first three joints very narrowly ringed on median pair. Claw formula 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.8 mm.

Male.—Proboscis more swollen than in the female. Palpi exceeding the proboscis by the length of the last joint, slender, penultimate joint slightly thickened, last joint tapered; vestiture black, with a narrow white ring at bases of last two joints and a broad one at middle of long joint; short black hairs on last two joints and tip of long joint. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with a black ring at insertions of hair-whorls; hairs long, black, dense. Coloration similar to the female. Abdomen elongate, depressed, broadened apically; dorsal white bands somewhat broader; lateral ciliation long, rather coarse, moderately abundant, yellowish. Wings narrower than in the female, the stems of the fork-cells about the same, vestiture somewhat more sparse. Claw formula, 1.1–1.1–0.0.

Length: Body about 3 mm.; wing 2.5 mm.

Genitalia (plate 12, fig. 86): Side-pieces twice as long as wide, tips conically tapered, a median quadrate prominence cleft nearly to its base, the outer bearing

Digitized by Google

five rods, the inner two; clasp-filament slender, enlarged mesially with an articulated terminal spine. Harpes with a long, slender columnar process, curved at tip, bearing a row of teeth. Harpagones elliptical, recurved. Basal appendages remote, rounded, setose.

Larva, Stage IV (plate 109, fig. 365).—Head rounded, widest through eyes, weakly convex on sides, a notch at insertion of antennæ, front margin arcuate. Antennæ slender, sparsely and minutely spined, with a single hair beyond middle; three short setæ and a stout one at tip and a short digit on a pedicel. Upper pair of dorsal head-hairs in fours, lower pair double, ante-antennal tuft multiple, short. Mental plate triangular, straight on the sides, with a projecting central tooth and ten on each side, last small and remote. Mandible rounded triangular, base produced into a blunt angle, a large patch of coarse spines without; a long filament and a very short one from a notch before tip; an outer row of cilia from a collar; a row of short conical processes on outer margin bearing tufts of long fine hairs; dentition of four teeth on a process, first and fourth longest; a short tooth at base, two broad serrate filaments and five tufted hairs within; process below curved, widely furcate, with a double row of hairs along margin and a tuft at tip of each limb; basal angle small, with a row of hairs within and a short row at base. Maxilla irregularly spherical, divided by an oblique suture; inner half with a row of bristly spines along margin and two cleft stout rows within; a tuft of long hairs at tip; outer half with a single articulated filament near tip, a group of fine hairs within and a horn-like process below. Palpus rudimentary, with four rather long minute digits. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter; skin glabrous. Air-tube slightly fusiform, over five times as long as wide; pecten occupying basal third; single teeth short, broadly triangular, smooth; five long hair-tufts on posterior margin, one laterally near middle of tube; terminal hooks fine. Lateral comb of eighth segment of numerous scales in a narrow triangular patch; single spine elongate, fringed with long spinules. Anal segment about as long as broad, ringed by the plate; dorsal tuft of two long hairs on each side; ventral brush sparse, confined to the barred area. Anal gills longer than the segment, broad and rather bluntly rounded.

The larvæ live in the water between the leaves of Bromeliaceæ.

Island of Trinidad to southern Brazil.

Trinidad (F. W. Urich). The species is reported also from São Paulo, Brazil (Theobald); Santos, Rio de Janeiro and Bahía, Brazil (Bourroul).

CULEX CONSOLATOR Dyar & Knab.

Culex consolator Dyar & Knab, Proc. Biol. Soc. Wash., xix, 169, 1906.
Culex consolator Theobald, Mon. Culic., v, 613, 1910.

ORIGINAL DESCRIPTION OF CULEX CONSOLATOR:

The larva is very close to *Culex rejector* Dyar & Knab, unbred (Journ. N. Y. Ent. Soc., xiv, 231, 1906), found in Bromelia water at Cordoba, Mexico. It differs in having the hair tufts on the tube long, the anal segment with a lateral rosette of spines. A single male was bred by Mr. Urich form a larva in Bromelia water at Arima, Trinidad.

♂. Head black, with narrow, curved whitish-gray scales behind and black setae. Proboscis black, palpi black, very hairy, with white rings at the bases of the joints; antennae black. Thorax golden brown, with pale longitudinal striation, under a higher power with sparse golden scales and coarse black setæ, two whitish dorsal impressed lines and an oblique one on the pleura before the wing insertion. Abdomen black with distinct white basal bands; thorax below greenish; legs black, femora pale below; all the tarsi with narrow white basal rings.

***Type.*—Cat. No. 10,019, U. S. Nat. Mus.**

Digitized by Google

DESCRIPTION OF MALE AND LARVA OF CULEX CONSOLATOR (FEMALE UNKNOWN):

Male.—Proboscis long, straight, moderately stout and thickened along apical half, vestiture entirely black. Palpi long, exceeding the proboscis by more than the length of the last joint; long joint more than half the length of entire palpus, slender at middle and thickened apically, just below its middle a pale ill-defined constriction; last two segments about equalling each other in length and together not as long as preceding segment; terminal segment tapering and pointed; vestiture entirely black, except a narrow white ring at bases of last two segments; last two joints and apex of long joint with numerous very long black hairs. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, pale, with black rings at insertions of hair-whorls; hairs of whorls long, brown; tori subspherical, with a cup-shaped apical excavation, luteous. Occiput black, clothed with pale-yellowish, narrow, recumbent scales on the vertex, broad, flat whitish ones on the cheeks, margins of eyes white; some erect, pale, forked scales on the nape.

Mesonotum brownish; vestiture of uniformly bright bronzy-brown, small, narrow curved scales; setæ brown, rather sparse, but coarse and very long. Scutellum trilobate, with bronzy-brown scales; a group of setæ on each lobe, all very long. Postnotum elliptical, prominent, pale brownish, nude. Pleuræ light greenish, a dark, transverse stripe below wing and another across middle.

Abdomen narrow at base, depressed and broadening towards apex; vestiture above deep black, with narrow whitish basal bands; first segment unbanded and with long pale setæ; eighth segment entirely whitish scaled; venter yellowish-white scaled, apices of segments blackish; lateral ciliation short, coarse, and black; hind margins of segments with delicate pale cilia.

Wings rather broad; veins with narrow brown scales, those on fork of second vein slightly broader and more dense; second marginal cell long, nearly twice as long as its petiole; stem of second posterior cell scarcely longer than cell; basal cross-vein more than its own length from anterior cross-vein.

Legs slender, rather long; vestiture black with a bronzy luster; femora pale beneath and at sides nearly to apices; posterior tibiæ with small white tip; all the tarsi narrowly white ringed at bases of all the segments, the rings broadest on hind tarsi. Claw formula, 1.0–1.0–0.0.

Length: Body 3 mm.; wing 2.5 mm.

Genitalia (plate 12, fig. 87): Side-pieces more than twice as long as wide, tips conically tapered; marginal appendages on two prominences, well separated but contiguous at base, inner with three spines, outer situated at middle of side-piece bearing four rods and a leaf-like appendage. Clasp-filament long moderate, pilose at tip, with a small terminal appendage. Harpes furcate, one branch with a rounded tip, the other produced into a slender column, bent over at tip and bearing a row of teeth arranged like a comb. Harpagones probably divided, obscured in specimen.

Larva, Stage IV (plate 111, fig. 374).—Head missing. Body with skin smooth; lateral abdominal hairs in twos after second segment, single on sixth. Comb of eighth segment of many spines in a large triangular patch. Air-tube very long and slender, straight, over sixteen times as long as wide, pecten of few long teeth, on basal fifth of tube; a single, rather long hair at middle on posterior margin and another shorter one near apex; terminal hooks slender, simple. Anal segment much longer than wide, ringed by the plate, which has a lateral rosette of spines; hairs all missing in our specimen; ventral brush confined by the chitinous ring. Anal gills longer than the plate, slender, pointed, equal.

The larvæ live in the water between the leaves of Bromeliaceæ.

Island of Trinidad, West Indies.

Arima (F. W. Urich).

Digitized by Google

CULEX REJECTOR Dyar & Knab.

Culex rejector Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 221, 1906.

ORIGINAL DESCRIPTION OF CULEX REJECTOR:

Antennæ with the tuft near the outer third, pale; head hairs, the upper tuft multiple, the lower single; body glabrous; lateral hairs in twos on segments 2 to 5, single on the sixth; tracheal tubes narrow, angled. Air tube very long, 10 × 1, nearly straight, with four small tufts on posterior margin; pecten of very long spines to one-fifth. Lateral comb of the eighth segment of long spine-like scales. Lateral tuft of the anal segment very large; gills long and pointed.

Collected by the junior author in a large Bromeliaceous plant at Cordoba, Mexico, with *C. gravitator*. All these larvæ died, presumably from lack of their natural food.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout	19
19.	Air tube with small double or single hairs or bare	31
31.	Air tube uniform, without any swelling	32
32.	Air tube with slight tufts	33
33.	Pecten of the air tube reaching one-fourth or less	35
35.	Pecten sparse and long	36
36.	Lateral hairs in twos after the second segment; comb of the eighth segment of very long spines	*rejector*

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX REJECTOR:

Female.—Proboscis slender, uniform, labellæ conically tapered; vestiture bronzy black; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, less than one-fourth as long as proboscis, slender, bronzy black. Antennæ moderate; joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, luteous, darker within. Clypeus rounded triangular, blackish brown, nude, small. Eyes black. Occiput blackish, clothed broadly with narrow, curved, pale ochraceous scales; ocular margins white scaled; cheeks clothed with broad, flat gray scales; many slender, erect, forked, brown and ochraceous scales dorsally.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with narrow whitish scales and black bristles. Mesonotum dark brown, an impressed median line, on either side of it a bare stripe; vestiture of small narrow, curved, bronzy brown scales, uniform, or the scales on anterior angles and anterior half of lateral margin broadly shining yellowish, forming a lunate patch on each side, those surrounding ante-scutellar space grayish white. Scutellum trilobate, clothed with narrow, curved whitish scales, each lobe with a tuft of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ greenish, with a transverse dark band under the wing and another across the middle; some patches of small elliptical white scales; coxæ pale yellow.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black with a strong bronzy reflection, a row of narrow basal segmental white bands or median dorsal white patches, or without any dorsal markings; a row of lateral, basal, segmentary, triangular white patches, joining bands when present; venter whitish scaled.

Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins rather long, linear, brown, those on costa blackish with a bronzy and blue luster, scales on fork of second vein denser, narrowly ovate. Halteres whitish, with black knobs.

Digitized by Google

Legs slender, long; vestiture black with a blue and bronzy reflection; hind femora broadly white beneath nearly to tips, knees white; tibiæ narrowly white at base and apex; hind tarsi with narrow white rings at bases of all the joints; fore and mid tarsi unbanded. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis straight, slightly enlarged toward apex. Palpi about as long as the proboscis, slender, uniform, the tip blunt and with a few stout hairs; vestiture bronzy black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, stout, whitish, with black rings at insertions of hair-whorls; hairs long, dense, brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells about the same, vestiture somewhat more sparse. Abdomen elongate, slender, enlarged near apex; dorsal white bands broad, expanded laterally on sixth and seventh segments, eighth segment wholly white scaled; lateral ciliation moderate, rather sparse, pale. Claw formula, 1.1–1.1–0.0.

Length: Body about 2.5 mm.; wing 2 mm.

Genitalia (plate 9, fig. 58): Side-pieces over twice as long as wide, conical; a truncate prominence towards base bearing two stout rods with hooked tips and surrounded by dense, fine setæ. Clasp-filament stout, moderate, narrowed at tip, bearing an articulated terminal claw. Harpes with a comb-shaped process at end of a long rod, both harpes and harpagones plate-like, divided, revolute and superposed. Unci slender, approximate. No basal appendages.

Larva, Stage IV (plate 109, fig. 367).—Head rounded, widest through eyes, a large notch at insertion of antennæ, front margin arcuate. Antennæ long, slightly curved, smooth, a moderate tuft from a notch before apical third; three long setæ, a short one and a digit at tip. Upper pair of dorsal head-hairs multiple, lower pair single; ante-antennal tuft multiple, short. Mental plate small, triangular, with a large prominent central tooth and nine on each side, basal ones small and remote. Mandible triangular, base produced into a rounded prominence; three filaments before tip; an outer row of cilia from a collar; a row of high conical prominences on outer margin, each bearing a tuft of long fine hairs; dentition of a single tooth on a prominence with a row of thick spines below; a spine before, a long smooth filament and five serrate hairs within; process below sloping obliquely basally, widely but shortly furcate, with a median row of hairs at tip of each limb; basal angle small, with a row of hairs within; a row of hairs at base. Maxilla elongate, rounded at tip, divided by a suture; inner half with long spines along margin and two rows of cilia within, a long spine at outer third; a row of long hairs at tip running down along suture; outer half with two small filaments next suture at lower third. Palpus rudimentary, with four long digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, in twos on second to fifth, single on sixth; tracheal tubes narrow, angled in the segments; skin glabrous. Air-tube very long, slightly widened at base, ten times as long as wide; pecten of long simple spines not quite reaching basal fourth; four short slight tufts on posterior margin beyond pecten. Lateral comb of eighth segment of many spines in a triangular patch; anterior spines slender, pointed, posterior ones larger, thick and rounded, all smooth. Anal segment twice as long as wide, ringed by the plate; dorsal tuft of two long hairs on each side; a small lateral hair; ventral brush moderate, confined to the barred area. Anal gills long, nearly twice as long as the segment, evenly tapered.

The larvæ live in the water between the leaves of Bromeliaceæ. Mr. Knab found them in such situations whenever there was water in the plants. They

Digitized by Google

were found both alone and associated with *Culex stenolepis, Wyeomyia abebela,* and *Megarhinus superbus.*

Mexico.

Córdoba, June 14, 1905; December 23, 1907; January 16, March 17, 1908 (F. Knab).

Culex rejector was first characterized from the larva. Mr. Knab, on his second visit to Córdoba, succeeded in breeding the larvæ and making the adult known. The adult occurs in two forms, the thorax either adorned or plain, exactly as in *Culex jenningsi,* but we have not thought it worth while to propose separate names for these forms.

CULEX JENNINGSI Dyar & Knab.

Culex jenningsi Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 204, 1907.
Culex jenningsi var. *gaudeator* Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 204, 1907.
Culex jenningsi Busck, Smiths. Misc. Colls., quart. iss., lii, 69, 1908.
Culex gaudeator Busck, Smiths. Misc. Colls., quart. iss., lii, 70, 1908.
Culex jenningsi Theobald, Mon. Culic., v, 615, 1910.
Culex gaudeator Theobald, Mon. Culic., v, 615, 1910.

ORIGINAL DESCRIPTION OF CULEX JENNINGSI:

♀.—Proboscis moderately long and slender, not swollen towards the apex, clothed with black scales, not ringed; palpi short, black scaled; occiput clothed with dark scales and lighter ones intermixed, margin of the eyes white scaled; mesonotum clothed with dark-brown scales with bronzy luster with several faintly indicated longitudinal ridges; metanotum dull brown; abdomen depressed, truncate at the tip, clothed with black scales which show a bronzy luster in some lights, the second, third and fourth segments have white basal bands, on the succeeding segments these are represented only by triangular lateral spots, a dark-blue metallic reflection at the tip of each segment, beneath the abdomen is dark scaled with distinct white basal bands; legs black with bronzy luster, the knees and apices of the tibiae on the hind legs silvery white, hind tarsi narrowly ringed with silvery white at the bases; pleura pale greenish with two blackish longitudinal stripes; claws simple; veins of the wings brown scaled, the scales long and narrow. Length, 3 mm.

♂.—Palpi long and very slender, slightly longer than the proboscis, the apices blunt, black scaled without white rings; antennae densely plumose; abdomen with narrow silvery-white basal bands on all the segments. Length, 3 mm.

Four specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvae in water in the leaves of Bromelias.

Type.—No. 10867, U. S. National Museum.

Allied to *Culex consolator* Dyar & Knab.

Named, at the suggestion of Mr. Busck, in honor of Mr. A. H. Jennings, Special Sanitary Inspector of the Canal Zone.

ORIGINAL DESCRIPTION OF CULEX GAUDEATOR:

♀.—Proboscis moderately long and slender, enlarged at the apex; palpi short, black scaled; occiput clothed with flat silver-gray scales and with numerous upright forked ones, mesonotum deep-brown scaled, on the anterior half a broad marginal yellowish stripe which curves inward at the middle; the posterior end of the stripe may form a detached dot or the whole marking may be absent; antescutellar bare space surrounded by light-colored scales, the light markings show a brassy or silvery luster in changing lights; scutellum silvery scaled; pleura light brown with patches of white scales; metanotum deep pitchy brown; abdomen depressed, truncate at apex, clothed above with black scales, at the sides with distinct basal triangular white patches, beneath black with broad white basal segmental bands; legs dark with bronzy luster, the knees capped with silvery, hind tibiæ with a large silvery spot at the apex, tarsi narrowly ringed with silvery white at the bases of the joints, the last joint of the hind tarsi dark on the apical two thirds; claws simple; scales of the wing-veins brown. Length, 3 mm.

♂.—Palpi long and very slender, nearly as long as the proboscis, black scaled without white rings; abdomen dark scaled with distinct bronzy luster and with narrow basal segmentary white bands, which become dilated at the sides, beneath uniformly silvery white, except the extreme apex. Length, 2.5 mm.

Seven specimens, Tabernilla, Canal Zone, Panama (August Busck, collector), bred from larvæ in water in the leaves of Bromelias.

Digitized by Google

Type.—No. 10871, U. S. National Museum.

Nearly allied to *Culex imitator* Theobald, but the thoracic markings less silvery and the tarsal bandings narrower.

We describe this form as a variety of *Culex jenningsi* Dyar & Knab, in which the thorax is ornamented. The basal abdominal bands of *jenningsi* are lost in this form, but may be seen under the microscope as 3 or 4 scales at the bases of the segments. The white rings on the tarsi are of a different width.

The larva is closely similar to that of *Culex rejector* Dyar & Knab, unbred, found in Bromelias at Cordoba, Mexico. It is possible that the species is the same, but we await the receipt of adults from Mexico before a final decision.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX JENNINGSI:

SYNOPSIS OF VARIETIES.

Thorax adorned with yellowish silvery gray markings..... *gaudeator* Dyar & Knab
Thorax unadorned, uniformly brown-scaled..... *jenningsi* Dyar & Knab

Female.—Proboscis slender, uniform, labellæ conically tapered; vestiture bronzy black, setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, less than one-fourth as long as proboscis, slender, bronzy black. Antennæ moderate, joints subequal, rugose, pilose, black; hairs of whorls sparse, moderate, black; tori subspherical, with a cup-shaped apical excavation, luteous, darker within. Clypeus rounded triangular, brown, nude, small. Eyes black. Occiput blackish, clothed broadly with shining, pale ochraceous, narrow curved scales, the ocular margin white scaled; many slender, erect, forked, dark brown scales dorsally; cheeks clothed with broad, flat, silvery white scales.

Prothoracic lobes elliptical, remote dorsally, brown, clothed with narrow whitish scales and black bristles. Mesonotum dark brown, a median impressed line, on either side of it a narrow bare stripe; vestiture of small, narrow, curved, uniformly bronzy-blackish scales, or the scales on anterior and lateral margins and a pair of spots on middle of disk shining pale yellowish, those surrounding ante-scutellar space grayish white. Scutellum trilobate, clothed with narrow, curved silvery scales, each lobe with a group of black bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ green, with a transverse dark band under the wing and another across the middle; some patches of small, elliptical silvery white scales; coxæ pale greenish.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture black with a deep bronzy reflection, a row of narrow basal segmental white bands, or median dorsal basal segmentary patches of white scales, or unbanded, a row of lateral, basal, segmental, triangular white patches, joining bands when present; first segment with a patch of black scales and many pale hairs; venter whitish scaled.

Wings moderate, hyaline; petiole of second marginal cell about half as long as its cell, that of second posterior cell as long as its cell; basal cross-vein distant more than its own length from anterior cross-vein; outstanding scales of veins rather long, linear, brown, those on the costa blackish with a bronzy and blue luster, scales on fork of second vein denser, but all linear, truncate at tips. Halteres whitish, with black knobs.

Legs slender, long; vestiture black with a blue and bronzy reflection; hind femora broadly white beneath nearly to tip; knees white; tibiæ narrowly white at base and apex; hind tarsi with narrow white rings at bases of all the joints, broad in some specimens; fore and mid tarsi unbanded. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Male.—Proboscis gradually enlarged towards apex. Palpi about as long as the proboscis, slender, uniform, the tip blunt, with a few stout hairs towards tip; vestiture uniformly black. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, whitish, with black rings at

Digitized by Google

insertions of hair-whorls; hairs long, dense, black. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells about the same, vestiture somewhat more sparse. Abdomen elongate, subcylindrical, somewhat depressed, very gradually enlarged towards apex; lateral white spots larger, particularly on seventh segment; lateral ciliation moderate, rather sparse, brown. Claw formula, 1.1–1.1–0.0.

Length: Body about 2.5 mm.; wing 2 mm.

Genitalia: Side-pieces over twice as long as wide, conical; a long, slender prominence near the middle bearing two stout rods with hooked tips; a group of dense setæ near the tip. Clasp-filament stout, moderate, narrowed at tip, bearing two articulated terminal claws. Harpes with a comb-shaped process at end of a long rod, both harpes and harpagones plate-like, divided, revolute and superposed. Unci slender, approximate, with recurved tips. No basal appendages.

Larva, Stage IV (plate 111, fig. 373).—Head rounded, widest through the eyes, a large notch at insertion of antennæ, front margin arcuate. Antennæ long, slightly curved, smooth, a large tuft from a notch at apical third; three long setæ, a short one and a digit at tip. Upper pair of dorsal head-hairs multiple, lower pair single; ante-antennal tuft multiple, short. Mental plate small, triangular, with a large prominent central tooth and nine on each side, basal ones small and remote. Mandible triangular, base produced into a rounded prominence; three filaments before tip; an outer row of cilia from a collar; a row of high conical prominences on outer margin, each bearing a tuft of long fine hairs; dentition of a single tooth on a prominence with a row of thick spines below; a spine before, a long smooth filament and five serrate hairs within; process below sloping obliquely basally, widely but shortly furcate, with a median row of hairs and a tuft at tip of each limb; basal angle small, with a row of hairs within; a row of hairs at base. Maxilla elongate, rounded at tip, divided by a suture; inner half with long spines along margin and two rows of cilia within, a long spine at outer third; a row of long hairs at tip running down along the suture; outer half with two small filaments next suture at lower third. Palpus rudimentary, with four long digits. Thorax rounded, wider than long. Abdomen moderate, anterior segments shorter; lateral hairs in threes on first segment, in twos on second to fifth, single on sixth; tracheal tubes narrow, angled in the segments; skin glabrous. Air-tube very long, slightly widened at base, over sixteen times as long as wide; pecten sparse, of long simple spines, not reaching basal sixth; four short, slight hairs on posterior margin beyond pecten. Lateral comb of eighth segment of many spines in a triangular patch; anterior spines slender, pointed, posterior ones larger, thick and rounded, all smooth. Anal segment twice as long as wide, ringed by the plate; dorsal tuft of two long hairs on each side; a small lateral hair; ventral brush moderate, confined to the barred area. Anal gills longer than the segment, evenly tapered.

The larvæ live in the water between the leaves of Bromeliaceæ. The eggs are inclosed in a gelatinous mass and deposited in the water. Mr. Busck says:

"The eggs of this species are very remarkable, quite different from any mosquito eggs at present known. They are laid in an egg-shaped, gelatinous mass about 6 to 10 mm., which suggests a mass of frogs' eggs. The masses contained about twenty-five eggs, each of which is oblong, more pointed at one end and rounded at the other, and each surrounded by its own spherical gelatinous envelope, about 2.5 mm. in diameter. The egg-mass floats at the surface of the water, kept buoyant by small air-bubbles, one near the end of each egg. The gelatinous substance is consumed at least partly by the newly hatched larvæ."

Central America.

Digitized by Google

Tabernilla, Canal Zone, Panama, July 10, 1907, associated with species of *Wyeomyia* (A. Busck); Fort San Felipe, Porto Bello Bay, Panama, January 4, 1908; February 10, 1909 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, January 4, and April 8, 1908 (A. H. Jennings); Cascajal River, Panama, May 30, 1908; February 18, 1909 (A. H. Jennings); Porto Bello, Panama, February 16, 1909 (A. H. Jennings); Upper Pequini River, Panama, March 24, 1909 (A. H. Jennings); San José, Costa Rica, 1300 meters (C. Picado).

CULEX OCELLATUS Theobald.

Culex ocellatus Theobald, Mon. Culic., iii, 222, 1903.
Culex ocellatus Luts in Bourroul, Mosq. do Brasil, 43, 1904.
Culex ocellatus Luts in Bourroul, Mosq. do Brasil, 73, 1904.
Grabhamia ocellatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 21, 1906.
Culex ocellatus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 168, 1906.
Culex ocellatus Peryassú, Os Culicid. do Brazil, 198, 1908.
Culex ocellatus Theobald, Mon. Culic., v, 362, 1910.

ORIGINAL DESCRIPTION OF CULEX OCELLATUS:

Head dark brown to black, with grey scales, white at the sides and around the eyes. Thorax brown, with two dark eye-like spots at the roots of the wings. Abdomen deep brown, not banded or spotted. Legs deep brown, pale basally and ventrally, unbanded, with a metallic ochraceous tinge. Proboscis, palpi and antennae brown. Wings with typical brown *Culex* scales.

♀. Head black, with scanty narrow-curved grey scales in the middle, white flat ones at the sides, and white curved scales forming a border to the eyes. Antennæ brown, basal joint testaceous; proboscis thick, brown; palpi brown, densely scaled. Thorax brown—deep brown in some lights, pale in others—showing three more or less distinct median dark parallel lines and a dark eye-like patch on each side over the base of the wings with a line of slightly paler scales surrounding their inner edge, covered with very small narrow hair-like curved brown scales; scutellum paler brown, with a median dark crescentic patch and dark laterally, median lobe with six bristles, in two groups slightly separated; metanotum deeper brown than the scutellum; pleurae pallid.

Abdomen deep brown to almost black, with violet reflections; last segment smaller than the rest, apex acuminate, apparently no posterior border-bristles, but lateral ones, and some on the last segment; venter pallid.

Legs deep brown, unbanded; the coxae and venter of femora ochraceous, and, to some extent, the venter of the tibiae; ungues small, equal and simple.

Wings small, densely brown scaled, and with very pronounced veins, the median vein scales large in proportion to the size of the wing, the lateral long and thin; fork-cells short, the first sub-marginal longer, but no narrower than the second posterior, its base slightly nearer the base of the wing than that of the second posterior, its stem half the length of the cell; stem of the second posterior more than two-thirds the length of the cell; posterior cross-vein rather more than twice its own length distant from the mid cross-vein; costal border with dense spine-like scales; fringe brown, dense and long. Halteres with pale brown stem and fuscous knob.

Length.—2 to 3 mm.

Habitat.—Sao Paulo, Brazil (Dr. Luts).

Observations.—Described from a single ♀, practically perfect. It is one of the smallest *Culex* I have seen, and has particularly dense scaled wings. The thoracic ornamentation can only be seen in certain lights, when it is very prominent, in other lights the thorax looks almost unadorned.

Regarding this species, which was pointed out as new by Dr. Luts, and the name suggested by him, he writes as follows:—

"I send you a new *Culex* from bromelias which I propose to call *ocellatus*. It has a black spot at the root of the wing, another on the metanotum and a black line on the side; characters resembling *Uranotaenia Lowii* and *Culex pleuroscriptus*. For the rest, it seems a close relative of *C. imitator*, being also very greenish in general colour. The proboscis is rather long and downwardly directed, as in *Uranotaenia*."

The greenish colour does not appear in the dead specimen sent.

A fresh ♂ and ♀ were received later somewhat larger in size (4 mm.).

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX OCELLATUS:

Female.—Proboscis long, moderately expanded at tip, labellæ conically tapered; vestiture black with a bronzy reflection; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, slender, uniform, black, with a few outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, blackish, the second joint longer than third and no stouter; tori subspherical, with a cup-shaped apical excavation, luteous, brown on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, prominent, brown, nude. Eyes black. Occiput black, clothed with narrow, curved pale brownish scales dorsally, with many erect, forked ones intermixed, margins of eyes broadly white scaled, broad, flat white scales on the cheeks and reaching well up on sides; a row of coarse black bristles along margins of eyes.

Prothoracic lobes pale; vestiture of brown bristles. Mesonotum light brown, with two impressed longitudinal lines on anterior two-thirds, a large semicircular black bare spot in the membrane over root of wing, surrounded by a broad, pale brown, bare, slightly pruinose zone; vestiture of narrow, curved bronzy-brown scales; bristles long, coarse, brown. Scutellum trilobate, with similar vestiture to mesonotum, each lobe with a group of brown bristles. Postnotum elliptical, prominent, brown, pale on lateral margins, nude. Pleuræ and coxæ luteous, with a transverse dark band above base of coxæ and a small diffused spot in a whitish field beneath wings; a broad transverse band of white pruinosity immediately above black band.

Abdomen subcylindrical, truncate at tip; dorsal vestiture uniformly bronzy black, a row of dark bristles at tips of segments; first segment with many pale hairs; venter pale scaled, grading into the dorsal color.

Wings moderate, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell about equal to its cell; basal cross-vein more than its own length from anterior cross-vein; scales of veins brown, with a blue reflection on the costa, outstanding ones broadly linear, denser outwardly, particularly on fork of second vein. Halteres whitish, with blackish dorsal line and knobs.

Legs slender, rather long; vestiture bronzy black with a metallic reflection; femora pale beneath to apices; tibiæ and tarsi with a brassy luster beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.2 mm.

Male.—Proboscis long, swollen at tip. Palpi about four-fifths as long as the proboscis, slender, blunt at apices, uniform, a few stiff hairs at tips of segments, uniformly bronzy black. Antennæ plumose; last two joints long and slender, rugose, pilose, blackish, the others short, whitish, with broad black rings at insertions of the hair-whorls; hairs long, moderately dense, brown. Coloration similar to the female. Wings scarcely narrower than in the female, the stems of the fork-cells slightly longer, vestiture about the same. Abdomen subcylindrical, tip slightly expanded and with somewhat paler scales, very bristly; lateral ciliation rather coarse and short, brown. Claw formula, 1.0–1.0–0.0.

Length: Body about 2.5 mm.; wing 2 mm.

Genitalia (plate 9, fig. 59): Side-pieces more than twice as long as wide, tips conically tapered, a low median prominence bearing three rods each on a separate elevation. Clasp-filament short, rather thick, with an inserted terminal appendage. Harpes with a long, slender inner branch expanded at tip and divided into a number of teeth reaching to prominence of side-piece. Harpagones divided at right angles, both branches smooth, inner one long. Basal appendages remote, slender, elongated, bearing a few setæ.

Digitized by Google

Larva, Stage IV (plate 111, fig. 377).—Head rounded, transverse, sides bulging, widest before eyes. Antennæ long, rather slender, nearly smooth, a large tuft situated beyond basal two-thirds and arising from a slight notch. Upper pair of dorsal head-hairs triple, lower pair single, ante-antennal tufts in fours. Lateral abdominal hairs in fours after second segment; lateral comb of eighth segment of many spines in an irregularly triangular patch. Air-tube very long and slender, twelve times as long as wide, a little flared at base, then straight and uniform, without hairs; terminal hooks small; pecten of about ten teeth, the outer ones long, sparse. Anal segment slender, much longer than wide, ringed by the plate; dorsal tuft of two very long hairs on each side; ventral brush well developed, confined by the chitinous ring. Anal gills equal, longer than the segment, bluntly pointed.

The larvæ live in the water between the leaves of Bromeliaceæ.

Trinidad to Brazil.

Trinidad, April 11, 1905 (F. W. Urich). The species is reported also from São Paulo and Pará, Brazil (Theobald, Bourroul).

Culex ocellatus is a highly specialized form of the group of *Culex* breeding in water-bearing Bromeliaceæ. Its relationship with such forms as *C. imitator* and *C. pleuristriatus* is obvious, not only in the general characteristics, but in the dark pleural stripes. In addition, *C. ocellatus* shows a strong, white, pruinose transverse bar on the upper half of the pleuræ, reminding one of the pleural markings of *Carrollia iridescens*. Other closely related species are *Culex conservator, C. corrigani* and *C. bisulcatus;* the first two of these show dark, diffuse, integumental spots over the roots of the wings, and all of them show their relationship in the structure of the male genitalia, and in the larval characters. In *C. ocellatus,* there is a shortening of the male palpi, leading up to the greater reduction in the three species mentioned.

CULEX GRAVITATOR Dyar & Knab.

Culex gravitator Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 207, 218, 1906.

ORIGINAL DESCRIPTION OF CULEX GRAVITATOR:

Antennæ with the tuft before the outer third, dark; hairs single; body glabrous; lateral hairs in threes on abdominal segments 3 to 6; tracheal tubes narrow, angulated within the segments. Air tube six-and-a-half times as long as wide, with long pecten reaching to one-third. Anal gills small.

Collected by the junior author in a large Bromeliaceous plant containing water between the leaves, growing in a thicket in a valley above Cordoba, Mexico. In spite of careful attention no adults were bred. Some of the larvæ lived two months after being collected; they probably died of starvation.

The following is an abstract of the table:

1.	Antennæ with the tuft outwardly placed, the part beyond slender	5
5.	Air tube four times as long as wide or over	7
7.	Anal appendages four, normal	8
8.	Air tube with four to ten paired tufts along the posterior line in a straight row, none displaced, or the hairs obsolete or absent	18
18.	Air tube without a crown of spikes, smooth throughout	19
19.	Air tube with long well-defined tufts	20
20.	Body glabrous or lightly granular	26
26.	Air tube regularly tapered, the tip not widened	28
28.	Both head hairs single	*gravitator*

DESCRIPTION OF LARVA OF CULEX GRAVITATOR (ADULT UNKNOWN):

Larva, Stage IV (plate 105, fig. 350).—Head rounded, widest through eyes, a large notch at insertion of antennæ, front margin arcuate. Antennæ large, slightly curved, basal two-thirds thick and well spined, a large tuft from a notch; two long setæ nearly at tip, a long seta, a short one and a digit at tip. Both pairs of dorsal head-hairs single, ante-antennal tuft multiple. Mental

Digitized by Google

plate small, triangular, with a large, stout central tooth and six on each side, two basal ones larger. Mandible quadrangular; three long filaments and two short ones before tip; a row of small transverse rounded prominences on outer margin, each bearing a tuft of fine hairs; dentition of two large teeth with a small one between and a group of short spines below; a spine before, a long smooth filament and row of feathered hairs within; a process below obscurely furcate, with a row of hairs outwardly and a tuft at tip of each limb; basal angle small, with a row of stiff hairs within, the two outermost of which are feathered; a basal row of hairs. Maxilla much elongated, the apex flatly rounded and consisting entirely of the outer half, a suture separating the two halves; inner half with a row of long spines on margin, the basal ones serrate; two rows of cilia within; a stout articulated spine next the suture; a row of long hairs at tip running down along the suture; outer half with two filaments at basal third and a few hairs within. Palpus very small, with four long straight apical digits. Thorax rounded, wider than long; lateral abdominal hairs in threes on third to sixth segments; tracheal tubes narrow, angulated within the segments; skin glabrous. Air-tube long, straight, gradually tapered, about six and a half times as long as wide; pecten of long teeth, reaching nearly one-third, single teeth coarsely serrate on one side; five large tufts on posterior margin beyond pecten, shortening progressively towards tip. Lateral comb of eighth segment of many spines in a large triangular patch; single spine elongate, widened at tip, with an apical fringe of spinules. Anal segment nearly twice as long as wide, ringed by the plate; dorsal tuft of two long hairs and a short one on each side; ventral brush well developed, confined to the barred area. Anal gills shorter than the segment, tapered.

The larvæ live in the water between the leaves of Bromeliaceæ.

Mexico.

Córdoba, June 14, 1905, and December 23, 1907 (F. Knab).

This species is especially difficult to rear, and Mr. Knab obtained no adults on his first visit to Córdoba. On his second visit he was able to find but very few larvæ, and the conditions were therefore still less favorable for obtaining adults than before. The adult is, therefore, still unknown.

CULEX INIMITABILIS Dyar & Knab.

Culex inimitabilis Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 208, 221, 1906.

ORIGINAL DESCRIPTION OF CULEX INIMITABILIS:

Collected in Bromelia water by Mr. Urich in Trinidad with *C. daumasturus*, which it resembles, but lacks the swelling on the tube. The body is smooth; the lateral hairs are in threes on the first segment, twos on the second, threes and short on the third to fifth, twos and long on the sixth. It was named "*Culex ? pipiens* L.," by Mr. Coquillett; rather a worse guess than usual.

The following is an abstract of the table:

1.	Antennæ with tuft outwardly placed, the part beyond slender.....	5
5.	Air tube four times as long as wide or over.....	7
7.	Anal appendages four, normal.....	8
8.	Air tube with four to ten paired tufts along posterior line in a straight row, none displaced, or the hairs obsolete or absent.	18
18.	Air tube without a crown of spikes, smooth throughout.....	19
19.	Air tube with small double or single hairs, or bare.....	31
31.	Air tube uniform without any swelling.....	32
32.	Air tube with single hairs or bare.....	37
37.	Pecten of air tube of five teeth, the last two long and remote, on basal one-seventh of the tube.....	*inimitabilis*

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX INIMITABILIS:

Female.—Proboscis moderately long, apical half much thickened, clothed with dark brown scales. Palpi short, about one-fifth as long as the proboscis, entirely dark scaled. Antennæ moderately slender, the joints subequal, coarsely ciliate, brown; hairs of whorls sparse, long, black. Occiput dark brown, clothed with pale bronzy-brown, narrow, curved scales; many erect, slender forked black scales dorsally; ocular margin broadly silvery white scaled; cheeks narrow, clothed with white scale.

Mesonotum brown, darker over roots of wings; vestiture of narrow, curved, light bronzy-brown scales; setæ sparse but very coarse, brown. Scutellum trilobate, with vestiture similar to that of mesonotum, each lobe with a group of long coarse bristles. Postnotum pale brown, with a small median carina, nude. Pleuræ and coxæ very pale brownish above, pale yellowish below, a transverse, dark diffuse stripe at middle and another at upper margin, a white pruinose band between them.

Abdomen subcylindrical, depressed, broadly truncate at apex; dorsal vestiture bronzy brown, nearly black in some lights, and with dull silvery basal bands, nearly obsolete on second and third segments but broad on succeeding ones, expanded at sides on seventh segment; first segment dark scaled and with many long pale cilia; ventral surface entirely pale; tip of abdomen with coarse bristles.

Wings broad, hyaline; scales bronzy brown, outstanding ones long and very narrow, dense on second vein; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell slightly shorter than its cell; basal cross-vein about twice its length from anterior cross-vein. Halteres pale, with blackish knobs.

Legs slender, rather long; vestiture bronzy brown, in some lights black with bluish iridescence; femora pale beneath to apices; tibiæ and tarsi with a pale-bronzy sheen beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.3 mm.

Male.—Proboscis straight, moderately long, anterior two-thirds gradually thickened, clothed with deep brown scales. Palpi long and slender, exceeding the proboscis by nearly the length of the last joint; vestiture entirely bronzy brown; last two joints and end of long joint slightly thickened and with sparse black hairs. Antennæ densely plumose; last two joints long and slender, the others short, with thick black rings at insertions of hair whorls; hairs very long, brown. Coloration similar to the female. Abdomen depressed, straight sided, slightly dilated at apex; dorsal white bands very narrow on second and third segments, broad on succeeding ones; venter white scaled; lateral ciliation moderate, pale. Wings slightly narrower than those of the female, venation and vestiture nearly the same. Claw formula, 1.0–1.0–0.0.

Length: Body about 2.5 mm.; wing 2 mm.

Genitalia (plate 9, fig. 57): Side-pieces over twice as long as wide, tips tapered and produced into a slender prominence, inner margin with a row of slender prominences, six in number of different lengths, each bearing a rod, except the subapical one which bears a leaf-like appendage. Clasp-filament slightly swollen in middle, tips slender and bearing a rather long articulated claw. Harpes slender with a long inner branch with a row of hairs at its summit. Harpagones divided into a number of lamellæ.

Larva, Stage IV (plate 111, fig. 375).—Head rounded, widest through eyes, a large notch at insertion of antennæ, front margin arcuate. (Antennæ missing.) Mental plate triangular, with a large prominent central tooth and eight on each side, basal ones more remotely spaced. Mandible triangular, with base produced into a rounded projection; three filaments before tip; an outer row of cilia from a collar; a row of rounded conical prominences on outer margin,

Digitized by Google

each bearing a long feathered hair; dentition of one long tooth on a process with a row of short spinose ones below; a spine before, a long smooth filament and four feathered hairs within; process below curved basally, obscurely furcate, with a row of hairs outwardly and a tuft at tip of each limb; basal angle absent, a row of hairs within; a row of hairs at base. Maxilla elongate, bluntly rounded at tip, divided by a suture; inner half with long spines at center of margin and shorter ones at base, a row of stout cilia within; a row of long hairs at tip running down along suture; outer half with two small filaments below middle. Palpus small, with four long, slender apical digits. Thorax rounded, wider than long; abdomen moderate, anterior segments shorter; lateral abdominal hairs in threes on first segment, in twos on second, in threes and short on third to fifth, in twos and long on sixth; skin smooth. Air-tube very long and slender, slightly widened at base, with a few pecten teeth scattered on basal seventh, of long simple spines; a single slight hair about middle of tube; length about fourteen times basal width, about thirty times apical width. Lateral comb of eighth segment of many spines in a triangular patch; single spine elongate, widened at tip, with an apical fringe of spinules. Anal segment twice as long as wide, ringed by the plate; dorsal tuft of two long hairs on each side; ventral brush moderate, confined to the barred area. (Anal gills missing.)

The larvæ live in the water between the leaves of Bromeliaceæ.

Island of Trinidad, West Indies; probably also in Brazil.

Trinidad (F. W. Urich).

Culex inimitabilis is a very characteristic member of the group of species breeding in Bromeliaceæ. The male palpi are longer than the proboscis, but, as in other species of the group, blunt at the tips; in spite of the long male palpi, the relationship with such forms as *C. conservator* and *C. corrigani* is close and obvious.

CULEX AZYMUS Dyar & Knab.

Culex azymus Dyar & Knab, Proc. Biol. Soc. Wash., xix, 169, 1906.
Culex azymus Theobald, Mon. Culic., v, 615, 1910.

ORIGINAL DESCRIPTION OF CULEX AZYMUS:

♀. Palpi, proboscis and antennæ black; head white behind, with a patch of black, forked scales in the middle, black on the sides below, setæ black. Thorax black, golden-brown scaled, uniform, without spots, setæ black; pleurae whitish, with a black band above bases of legs and another below wings. Abdomen black, with narrow whitish basal segmental bands, widening laterally, venter grayish white. Legs black, the femora pale below, tibiae and the first two tarsal joints appearing whitish on lower side in certain lights, unbanded.

Allied to *Culex pleuristriatus* Theobald, but lacking the thoracic spotting and any trace of the white tarsal bands.

The larva is allied to *pleuristriatus* (Journ. N. Y. Ent. Soc., xiv, 205, 209, 1906), but the pecten of the air tube has two detached teeth, which exceed the two basal hair tufts.

One specimen, bred from larvæ in Bromelia water at Arima, Trinidad by Mr. F. W. Urich.

Type.—Cat. No. 10,020, U. S. Nat. Mus.

DESCRIPTION OF FEMALE AND LARVA OF CULEX AZYMUS (MALE UNKNOWN):

Female.—Proboscis moderate, rather slender, swollen at tip, labellæ conically tapered; vestiture black with a blue reflection; setæ minute, curved, black, those on labellæ more prominently outstanding. Palpi slender, nearly one-fourth as long as proboscis, black, with a few outstanding setæ at base. Antennæ moderate; joints subequal, rugose, pilose, blackish, second joint a little longer than third; tori subspherical, with a cup-shaped apical excavation, luteous, shading to brown within; hairs of whorls sparse, moderate, black. Clypeus broadly rounded, convex, brown, nude. Eyes black. Occiput blackish, clothed broadly with narrow, curved bronzy-brown scales, dull silvery ones below and

Digitized by Google

along margins of eyes, scattered erect, forked black scales dorsally, a row of coarse, black bristles along margins of eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with black bristles. Mesonotum dark brown, pale along margins, clothed with narrow, curved bronzy-brown scales; bristles coarse, brown. Scutellum trilobate, mid lobe large, vestiture paler than on mesonotum, with a group of black bristles on each lobe. Postnotum elliptical, prominent, dark brown, pale on lateral margins, nude. Pleuræ and coxæ pale greenish, with a transverse broad dark band across the middle and another below roots of wings, the lower one more distinct, a silvery pruinose shade between them, a few white scales below and rows of pale bristles.

Abdomen subcylindrical, truncate at tip; dorsal vestiture black with a slight blue reflection, a row of lateral, small, basal, segmental, dull whitish patches which, on the posterior segments, extend dorsally to form very narrow bands; venter dull yellowish white scaled.

Wings moderate, hyaline; petiole of second marginal cell one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant twice its length from anterior cross-vein; scales of veins brown, with a blue reflection along costa, outstanding ones long, sparse, narrowly ligulate, denser on forks of second vein. Halteres pale, with blackish knobs.

Legs slender, rather long; vestiture black, with a blue and bronzy reflection; femora whitish beneath to apices; tibiæ and tarsi with a brassy reflection beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 2.5 mm.; wing 2.5 mm.

Larva, Stage IV (plate 104, fig. 345).—Head rounded, widest through eyes, somewhat produced anteriorly. Upper pair of dorsal head-hairs in threes, moderate, lower pair single, long; ante-antennal tuft multiple. Antennæ short, uniform, a small single hair slightly beyond middle. Lateral abdominal hairs in twos after second segment; comb of eighth segment of many spines in a large patch. Air-tube about five times as long as wide, tapering outwardly; pecten of small teeth reaching basal third; four long posterior tufts in a straight row, all three-haired, the basal one within pecten followed by a small single hair; terminal hooks minute. Anal segment about as long as wide, ringed by the plate, which has small spines on its posterior margin; dorsal tuft of two long hairs on each side; lateral tuft of two long hairs; ventral brush sparse, confined by the chitinous ring. Anal gills long, flexuous, about three times as long as the segment, pointed, equal.

The larvæ live in the water between the leaves of Bromeliaceæ.

Island of Trinidad, West Indies; probably also in Brazil.

Trinidad (F. W. Urich).

Subgenus CLIMACURA, new.

We establish this subgenus for *Culex melanurus* Coquillett. While we are unable to point out tangible generic characters for the adults of both sexes, we are convinced that the species ultimately will be separated generically. The male genitalia depart widely from the *Culex* type, and are much more primitive in structure. In both sexes the empodia are of unusual structure, and consist of a deeply serrate chitinous plate, distinctly a specialization. The egg-laying habits are less specialized than in *Culex,* the eggs being deposited singly upon the water surface. *Culex melanurus* has many points in common with *C. dyari,* both being generalized forms and anomalous in the genus *Culex;* but they are not closely related and, when removed, will have to be placed in separate genera.

Digitized by Google

CULEX MELANURUS Coquillett.

Culex melanurus Coquillett, Journ. N. Y. Ent. Soc., x, 193, 1902.
Culex melanurus Dyar, Journ. N. Y. Ent. Soc., x, 198, 1902.
Culex melanurus Dyar, Science, n. s., xvi, 672, 1902.
Culex melanurus Dyar, Proc. Ent. Soc. Wash., v, 143, pl. ii, fig. 17, 1903.
Culex melanurus Johannsen, Bull. 68, N. Y. State Mus., 416, 1903.
Culex melanurus Felt, Bull. 79, N. Y. State Mus., 337, 1904.
Ecculex melanurus Felt, Bull. 79, N. Y. State Mus., 391c, 1904.
Culex melanurus Blanchard, Les Moustiques, 348, 1905.
Melanoconion melanurus Dyar, Journ. N. Y. Ent. Soc., xiii, 26, 28, 1905.
Culicella melanurus Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culicella melanurus Felt, Bull. 97, N. Y. State Mus., 480, 1905.
Culex melanurus Smith, N. J. Agr. Exp. Sta., Rept. Mosq., 319, 1905.
Melanoconion melanurus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 24, 1906.
Mochlostyrax melanurus Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 223, 1906.
Melanoconion melanurus Dyar, U. S. Dept. Agr. Bur. Ent.,Circular 72, 3, 1906.
Melanoconion melanurus Theobald, Mon. Culic., iv, 510, 1907.
Neomelanoconion indecorabile Peryassú (in part), Os Culicid. do Brazil, 50, 1908.
Culex (*Melanoconion*) *melanurus* Viereck, 1st Ann. Rept. Comm. Health Pa., 471, 1908.
Melanoconion melanurus Theobald, Mon. Culic., v, 457, 1910.
Culex melanurus Morse, Ann. Rept. N. J. State Mus., 1909, 721, 1910.

ORIGINAL DESCRIPTION OF CULEX MELANURUS:

Near *pipiens*, but without distinct bands of light-colored scales at bases of the abdominal segments, the lateral scales on the wing veins rather broad and distinctly tapering at the base, etc. Black, the stems of the halteres and posterior and under sides of the femora, yellow, the intermediate short joints of the male antennae largely white, palpi of male not dilated; scales of occiput narrow, yellowish-white, a patch of broad white ones on each side, the upright ones black, scales of mesonotum golden yellow, those of the abdomen violaceous brown, a small patch of white ones at front angles of the segments beyond the second, those on middle of venter yellowish-white, scales of legs purplish-brown, in certain lights with a brassy tint, those on the yellow portion of the femora whitish; tarsal claws of female simple, the front and middle ones in the male one-toothed; wings hyaline; second basal cell much shorter than the first, petiole of the first submarginal cell nearly one-third as long as that cell. Length 3.5 mm.

Habitat.—Center Harbor, N. H.

Two females and two males bred by Dr. H. G. Dyar. Type No. 6701, U. S. N. M. The specific name was given in allusion to the distinctly blackish anal tube of the larva.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX MELANURUS:

Female.—Proboscis long and slender, subcylindrical, uniform, labellæ conically tapered, blackish; vestiture of bronzy-brown scales, paler beneath. Palpi short, about one-sixth as long as the proboscis, slender, black, with numerous outstanding setæ. Antennæ with the joints subequal, second and third joints slightly thickened and shorter, rugose, pilose, black; tori subspherical, with a cup-shaped apical excavation, blackish; hairs of whorls sparse, moderate, black. Clypeus broad, rounded, doubly excavated at base, blackish brown, nude. Occiput blackish brown, sparsely clothed with very narrow, curved, pale yellowish scales, denser sordid whitish ones along margins of eyes, many erect, slender forked black scales dorsally, cheeks clothed with lanceolate white scales; a row of bristles along ocular margins, more numerous than usual.

Prothoracic lobes elliptical, remote dorsally, with pale scales and brown bristles. Mesonotum dark reddish brown, with two broad, bare, longitudinal slightly paler lines; vestiture of sparse, long, hair-like light bronzy-brown scales and rows of long, coarse, brown setæ, scales around ante-scutellar space paler. Scutellum trilobate, brown, clothed with minute, curved pale-brown scales, each lobe with a large group of long brown bristles. Postnotum elliptical, prominent, brown, nude. Pleuræ and coxæ brownish luteous, with rows and

Digitized by Google

groups of long pale bristles and patches of whitish, suberect, broadly lanceolate scales.

Abdomen subcylindrical, truncated at tip; dorsal vestiture black with a bronzy-brown reflection, a row of rather coarse yellow hairs at apex of each segment; a row of small basal segmentary sordid ochraceous patches on the sides; basal half of last segment pale scaled, its tip bristly; venter ochraceous scaled, with a row of angular, subapical obscure bands with apices directed forward.

Wings rather narrow, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell a little shorter than its cell; basal cross-vein more than twice its own length distant from anterior cross-vein; scales brown, those on costa with a blue reflection, the outstanding ones long, sparse and broadly linear, the others abundant, long, narrowly ovate; fringe rather narrow. Halteres pale brown.

Legs slender; femora ochraceous at base and beneath nearly to tips; knees narrowly whitish; vestiture otherwise black with a bronzy and violaceous reflection above and a stronger bronzy one beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 4 mm.; wing 4.5 mm.

Male.—Proboscis straight, moderately long and slender, gradually enlarged towards apex. Palpi exceeding the proboscis by nearly the length of the last joint; last two joints with end of the long joint slightly enlarged and bearing many brown hairs; scale vestiture bronzy brown, without annulations. Antennæ slender, plumose; last two joints long and slender, rugose, pilose, black, the others short, but longer than usual, whitish, ringed with black at insertions of hair-whorls; hairs long, brown. Coloration similar to the female. Wings scarcely narrower than in the female, the stems of the fork-cells slightly longer; vestiture similar. Abdomen elongate, slender, depressed; lateral spots more whitish and tending to form bands; lateral ciliation abundant, very long, fine, yellowish brown. Claw formula, 2.1–2.1–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 19, fig. 140): Side-pieces more than twice as long as wide, tapered outwardly; marginal appendages absent. Basal lobe stout, conical, setose. Clasp-filament long, slender, with an articulated terminal spine. Harpes furcate, semicircular, tips recurved, inner branch shorter. Harpagones wanting. Basal appendages short, remote setose. Unci contiguous, revolute, forming a basal cylinder.

Larva, Stage IV (see figure of the entire larva, plate 52).—Head large, quadrate, as wide as thorax, wider than long, sides straight, a broad notch at insertion of antennæ, front margin nearly straight. Eyes large. Antennæ very long, slender, densely spined, a large tuft from base of outer sixth, the part beyond slender; two very long hairs before tip, a long hair, a short one and a digit at apex. Upper pair of dorsal head-tufts multiple, lower pair single; ante-antennal tuft multiple. Mental plate broadly triangular, a large central tooth with eight on each side, sixth and seventh large and longer than adjacent ones, eighth very small. Mandible subquadrangular; two filaments outwardly before tip, two shorter filaments, two feathered hairs and two small serrate filaments arising from their bases; an outer row of cilia from a collar, a few very small hairs on outer margin; dentition of four divaricate ensiform teeth on a process, the first the largest; two long, spine-shaped teeth before, a conical tooth at base, a filament and a row of fine feathered hairs within; process below widely furcate, with patches of hair; four filaments within; basal angle very slender and sharp; a row of stout hairs at base. Maxilla elongate, irregular, divided by a suture; inner half with long hairs toward base; a tuft of long hairs at apex running along suture; outer half with filaments very small, some short hairs next the

Digitized by Google

suture, the spine on the other side long. Palpus very small, but the four terminal digits long and slender. Thorax rounded, wider than long; hairs abundant, very long, anterior thoracic ones twice the length of head. Anterior abdominal segments short, posterior ones elongated; lateral tufts of first two segments multiple, those of third to fifth double, of sixth single; secondary hairs well developed. Tracheal tubes narrow, linear, expanded in metathorax, separated in seventh segment. Air-tube long, straight, scarcely tapered, about eight times as long as wide; pecten on basal third, of short teeth with a single basal branch, followed by a row of little tufts along posterior margin. Lateral comb of eighth segment a series of bar-shaped spines in a single row, each spine with a long tapered base and feathered margins. Anal segment about twice as long as broad, ringed by the plate; a dorsal hair and a tuft on each side; a small lateral tuft; ventral brush moderate, confined to the barred area. Anal gills scarcely as long as the segment, slightly tapered.

Culex melanurus passes the winter as fully-grown larva. The larvæ frequent permanent water, usually springs in marshes. There are, apparently, several broods during the season, the larvæ of the last brood remaining unchanged in the water throughout the winter. Dr. Dyar first found them in pools of some depth in cracks in rocks on an island in Lake Winnepesaukee (New Hampshire). The eggs are apparently laid singly on the water surface. Dr. Dyar found them in a pail of water that he had dipped from a spring-pool and carried to the house. On examining this water, after it had been carried home, two small whitish-gray specks were noticed, floating separately upon the surface. These proved to be eggs of this species, and afterward hatched, one of them developing into an adult. It does not seem probable that there could have been a mass of eggs which had been broken up by dipping the water; but as yet no other observation upon the eggs has been made in confirmation of this habit. The late Professor J. B. Smith of New Jersey made the following observations:

"Practically nothing is known of the habits of the adult; but it is reasonably certain that the species does not bite. It must be fairly abundant at Lahaway in May, but Mr. Brakeley has never taken it either in his room captures or in the field, day or night. No specimens have been taken by any of the collectors in their general gatherings.

"From time to time Mr. Brakeley had mentioned in his letters a 'bronze wriggler' which occurred in woodland springs, very late in the season, specimens being taken up to the middle of November; but no attempt was made to breed it until, after a specimen had been sent to Dr. Dyar, who pronounced it *melanurus*, a species originally taken by him in New Hampshire. In the winter of 1902–'03 Mr. Brakeley determined to test his belief that these larvæ hibernated in that condition and found that there were several places on his land where they could be found other than the springs, nearly or quite all of which had a greater or smaller supply. The chief point of interest was a stretch of swampy bog land that had been burnt over early in 1902, the fire eating through the moss in places and leaving a mass of irregular holes, varying in size and depth. Some of these were partly closed by vegetation covering in from the edges and making an overhang. The ground was springy and there were numerous springs round the edges, so that the water was always cold and usually clear; but with a flocculent sediment which was readily stirred up.

"January 9, 1903, with the thermometer 9 degrees above zero, the entire swamp was frozen solid. January 23d broke the ice on likely pools and made about a dozen dips in as many places. Nothing was found and the inference is that the insects shelter either in the mud or under the overhanging vegetation. January 30th, during a mild spell, collections were made in pools from which the ice had

Digitized by Google

just disappeared, and now quite a little series of specimens was obtained, some of them inactive and apparently dead, but all revived when brought indoors. On the 31st, covered another part of the same territory and found specimens everywhere: 'Little holes, not over two inches in diameter, full of water, turned out two or three specimens.' February 1st, collected additional specimens and brought in some of the ice to see whether larvæ were frozen in it. Found that there were none and that the specimens probably kept down below actual frost, if possible. February 7th, it was noted that there was considerable difference between the larvæ, as though two or more stages were represented, and, as a whole, they were more advanced than in December; in the larger specimens a distinct shield-like form of the thorax was now apparent. Collections were made throughout February, and the indoor cultures were under constant observation; but though the larvæ seemed to feed continually they did not grow and spent most of the time at the bottom of the jars; they do not need air from above the surface. On February 22d, when the ground was snow covered and everything frozen over, holes were made in the ice and active larvæ were dipped up from beneath it. The water here was 36 degrees, and in the woodland springs where other specimens were taken it ran 42 degrees. Rain and snow so filled the swamp area that the wrigglers were scattered over so large a territory it was almost impossible to find them. At this time a series of the specimens was sent to me to be developed in the laboratory, and these arrived in good condition. Throughout March collections were made, and during this time it became so dry that it seemed as if all the larvæ must have perished: yet after a rain there were as many as ever. They seem able, apparently, to seek out the wettest places and may even survive for a time in soft mud. April 2d and 3d, collected another lot of over 100 larvæ for shipment to me, and up to that time there had been no pupa seen. The first specimen in the culture material pupated April 4th, and as I obtained the first pupa just a day earlier, this may be considered the beginning of the pupation period. The pupa is small in proportion to the size of the larva and the period of this stage is from six to ten days. The last larvæ were collected by Mr. Brakeley May 5th, and in nature only one pupa was taken —an accidental mingled with *canadensis*.

"This record of collections made is an interesting one and proves positively that the larva of *C. melanurus* lives through the winter in the half-grown condition. It is essentially a clean-water wriggler and requires a sheltered locality, like woodland, or an over-grown swamp area, to develop. An area that freezes solid would probably prove fatal, but in spring-water the temperature rarely gets much below 40 degrees, even in the coldest weather, and when there is an ice-covering in the swamp there are the recesses under the edges and the deep, soft mud to serve as retreats. I have no record of the re-occurrence of this larva in the springs before October, and none of the summer collections sent in by Mr. Brakeley contained specimens. Nor have I seen any very small larvæ or eggs.

"A characteristic feature of the species is its remarkably slow growth in spring and the long delay in pupation. The larvæ are half grown, or more, before *canadensis*, or *aurifer*, are born, yet the latter become adult as soon, or sooner. They are slow in their movements and seem to take life easy, 'like a group of dreamy philosophers,' as Mr. Brakeley puts it. They are bottom-feeders of necessity, since the water in which they live has only a small supply of organic life, but in the leaves at the bottom of the springs and in the mud of the swamp-pools their food is found. So they have well developed trachea in the anal gills and are not dependent upon atmospheric air for their supply of oxygen. This peculiarity is also essential, as their swamp breeding places may and do become completely ice-covered."

Digitized by Google

In completion of the observations of Prof. Smith that the larvæ occur from late autumn to early spring, are those of Dr. Dyar and Mr. Knab. Dr. Dyar, in New Hampshire, found larvæ in various stages in July, from which adults were bred in August, and, in New York, he found larvæ in August. Mr. Knab, in Massachusetts, found a full-grown larva in August.

Eastern United States.

Center Harbor, New Hampshire, August 19, 1902 (H. G. Dyar); Tupper Lake, New York, larvæ August 11, 1905 (H. G. Dyar); Westfield, Massachusetts, larvæ August, 1903 (F. Knab); Lahaway, New Jersey, larvæ March 27 (J. T. Brakeley); Alexandria, Virginia, September 22, 1899 (F. C. Pratt); Lake Drummond, Virginia, October 29, 1906 (H. S. Barber); Augusta, Georgia, August 10, 1909 (W. V. Reed).

Dr. Peryassú has placed this species as a synonym to *Neomelanoconion indecorabile,* but evidently without examining specimens. We do not think there is any chance that this synonymy is correct, as we have never had *Culex melanurus* from without the limits of the United States. Besides, Theobald's description of *Culex indecorabilis* does not agree with specimens of *Culex melanurus* (see Mon. Culicid., iii, 241, 1903).

Subgenus CULICELLA Felt.

The genus *Culicella* was founded by Felt on the characters of the male genitalia of *Culex dyari;* but no other distinguishing characters were indicated (Bull. 79, N. Y. State Mus., 391c, 1904). Coquillett defined the genus by the bare stripes of the mesonotum (U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 1906); such stripes, however, are developed in various degrees in most species of *Culex.* The larva is of the *Culex* type, but differs in the presence of a series of hair-tufts ventrally on the anal segment, in front of the ventral brush and inserted in a series of perforations of the chitinous ring, as well as in the basally situated tuft of the air-tube. The male genitalia and the habits exhibit a generalized type. However, we are unable to point out good structural characters for separating both sexes of the adults from *Culex,* and so reluctantly treat the group as a subgenus only.

Recent work by J. C. H. de Meijere and F. W. Edwards proves that there exist in the old world at least two species of this generic type, intermediate between *Culiseta* and *Aëdes,* and connecting them by larval characters. The species (*fumipennis* Stephens and *morsitans* Theobald) are classified by de Meijere in *Culicada* (=*Aëdes*) and by Edwards in *Theobaldia* (=*Culiseta*); in fact they lie between the two. *C. dyari* is the only representative of this type in America. We believe that the genus *Culicella* will ultimately prove valid. These species are entirely out of place in *Culex,* lying, as we have said, between *Culiseta* and *Aëdes.*

CULEX DYARI Coquillett.

Culex dyari Coquillett, Journ. N. Y. Ent. Soc., x, 192, 1902.
Culex dyari Dyar, Journ. N. Y. Ent. Soc., x, 199, 1902.
Culex dyari Dyar, Proc. Ent. Soc. Wash., v, 143, pl. ii, fig. 13, 1903.
Culex dyari Johannsen, Bull. 68, N. Y. State Mus., 416, 1903.
Culex dyari Felt, Bull. 79, N. Y. State Mus., 306, 1904.
Culicella dyari Felt, Bull. 79, N. Y. State Mus., 391c, 1904.
Culicella dyari Dyar, Proc. Ent. Soc. Wash., vii, 48, 1905.
Culex dyari Dyar, Proc. Ent. Soc. Wash., vi, 40, 1904.
Culex dyari Dyar, Journ. N. Y. Ent. Soc., xii, 172, 1904.
Culicella dyari Felt, Bull. 97, N. Y. State Mus., 479, 1905.
Culex dyari Blanchard, Les Moustiques, 364, 1905.
Culex brittoni Felt, Ent. News., xvi, 79, 1905.
Culicella dyari Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 204, 1906.

Digitized by Google

Culicella dyari Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 22, 1906.
Culicella dyari Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 2, 1906.
Culex dyari Theobald, Mon. Culic., iv, 412, 1907.
Culex dyari Smith, Rept. N. J. Agr. Coll. Exp. Sta., 1908, 418, 1909.
Culex dyari Theobald, Mon. Culic., v, 362, 1910.
Aedes dyari Morse, Ann. Rept. N. J. State Mus., 1909, 719, 1910.

ORIGINAL DESCRIPTION OF CULEX DYARI:

Near *sylvestris*, but with a pair of bare vittæ on the mesonotum, simple tarsal claws in the female, etc. Dark brown, thorax more reddish-brown, stems of halteres, coxæ and greater portion of posterior side of femora, yellow; antennæ of male largely white on the intermediate short joints, the plumosity brown, with a yellow base; scales of palpi brown, the female having those at the apices white, the male with four rings of whitish ones, last joint of male palpi dilated, scales of occiput narrow, yellowish, a large patch of broad whitish ones on each side, the upright ones black; scales of thorax light yellowish, those of the abdomen black and with a broad band of yellowish-white ones at base of each segment; scales of legs black, mixed with a few yellow ones, those on the coxæ, on posterior side and at apices of femora and tibiæ, and at each end of the first three joints of the tarsi, yellowish-white; front tarsal claws of male bearing two teeth beneath one of the claws and one tooth beneath the other; wings hyaline, veins and scales brown, many of the lateral scales on the auxiliary and first veins are rather broad and distinctly taper to the base, the other lateral scales chiefly elongate, narrow and almost linear, second basal cell much shorter than the first, petiole of first submarginal cell over one-third as long as that cell. Length, 4 mm.

Habitat.—Center Harbor, N. H.

Three females and one male bred by Dr. H. G. Dyar, whose patient investigation of the larvæ of this family has resulted in a better understanding regarding the limits of the species, and to whom this unique species is respectfully dedicated. Type: No. 6700, U. S. N. M.

ORIGINAL DESCRIPTION OF CULEX BRITTONI:

Female.—Proboscis over half the length of the body, dark brown, minutely flecked with gray scales, apex yellowish gray. Palpi distinct, 5-segmented, basal two subglobular, the first very dark brown, the second brown, both sparsely clothed with hairs; third to fourth thickly clothed with scales and ornamented with rather sparse, long hairs; third joint yellowish, fourth and fifth dark brown, the latter yellowish at apex. Antennæ filiform, dark brown, rather thickly clothed with short, grayish hairs and with sparse, basal whorls of long setæ. Eyes dark brown or black, rather coarsely granulate. Occiput rather sparsely clothed with short, curved, yellowish scales and with numerous long, curved, black fork scales. Mesonotum with a pair of subdorsal, light brown, naked stripes extending to the posterior third, the median line and the lateral areas and posterior portions being dark brown and clothed with sparse, long, black bristles and numerous finer golden yellow ones. Laterally there are a few longer, yellow bristles. Scutellum grayish, sparsely clothed with light golden yellow, curved scales, a few longer ones posteriorly, and its posterior margin crowned centrally and laterally with long, black setæ, those on the sides forming distinct groups; patches of similar setæ occur at the base of the wings. Metanotum yellowish, smooth. Halteres yellowish, transparent. Abdomen clothed with very dark brown, almost black scales with distinct basal bands of yellowish white scales, those of the second and following segments being slightly broader than the others. Ventral surface of abdomen yellowish. Wings rather large, venation distinct, scales very thick, brownish, almost black along the costal margin, fringe slaty gray. Petiole of anterior fork cell about one-half its length, that of the posterior fork cell shorter and a little over half the length of its cell. Posterior cross vein about its own length from mid cross vein. Basal third of the third longitudinal vein with most of the linear scales appressed. Outer portion of fringe composed of scales of several lengths, giving a distinctly uneven border. Coxæ and basal portion of the femora yellowish white, the posterior portion of apical part of femora, the apex and posterior portion of tibiæ, its apex and posterior portion of the first tarsal segment, its apex and base of second and the apices of the third and fourth silvery yellowish; other parts dark brown. Tarsal claws simple. Length of body about 5 mm.; wing spread about 10 mm.

Described from a single well marked specimen taken by Mr. H. L. Viereck, at Branford, Conn., June 27, 1904.

This species presents a somewhat general resemblance to *Culicada cantator* Coq. It may be at once separated therefrom by the simple claws and the peculiar character of the wing fringe as noted above. It is also a much more distinctly marked species.

Digitized by Google

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULEX DYARI.

Female.—Proboscis long, uniform, labellæ conically tapered; vestiture black, with a bronzy luster, labellæ brownish; setæ small, curved, black, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, clothed with blackish scales, the tips yellowish scaled, with many short, stiff setæ. Antennæ long, the joints subequal, rugose, pilose, black, second joint slightly enlarged; hairs of whorls rather short, sparse; tori subspherical, with a cup-shaped apical excavation, yellowish, brown on inner side. Clypeus rounded triangular, blackish, nude. Occiput dark brown, rather sparsely clothed with coarse, narrow, curved, pale-yellow scales, denser towards the sides, margins of eyes and the cheeks white scaled, scales on lower part of sides flat; many very slender, erect, forked black scales, most numerous on the nape and sublaterally; setæ along margins of eyes rather short, curved, black.

Prothoracic lobes elliptical, remote dorsally, with narrow white scales and many black setæ. Mesonotum dark brown, reddish brown in two approximated longitudinal bare convex stripes and two others posteriorly at sides of antescutellar space; vestiture of short hair-like bronzy-brown scales in two broad stripes at outer sides of bare submedian stripes and on posterior half of disk, coarser pale yellowish ones in a median stripe; on sides of disk anteriorly, about lateral depression, about the ante-scutellar space, and along the posterior bare stripes. Scutellum trilobate, brown, clothed with narrow, curved, shining pale-yellow scales, each lobe with a large group of brown bristles. Postnotum elliptical, prominent, brown, pruinose, nude. Pleuræ and coxæ luteous, with darker spots and patches of lanceolate whitish scales and rows of pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of blackish-brown shining scales, bases of segments with pale-yellowish narrow bands; first segment with a small patch of white scales in the middle and with many pale hairs; venter sparsely clothed with pale dirty yellowish scales, and numerous dark hairs.

Wings ample, hyaline; petiole of second marginal cell much shorter than its cell, that of second posterior cell also shorter; basal cross-vein distant almost its own length from anterior cross-vein; scales brown, those on costa black, the outstanding ones numerous, broadly linear, densest apically; a slight tufting at base of third vein. Halteres pale, with blackish knobs.

Legs long and slender; vestiture blackish; femora whitish beneath to near apices, broadly so at base, knees yellowish white; tibiæ black, with yellowish apices, a narrow ill-defined pale line ventrally on median pair; tarsi blackish with bluish and bronzy reflections, the joints with minute basal yellowish-white rings or spots, last joint of hind tarsi entirely black. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 5.5 mm.

Male.—Proboscis straight, uniform. Palpi exceeding the proboscis by more than the length of the last joint, slender, blunt at tips; last two joints and end of long joint thickened and bearing many long black and yellowish hairs; vestiture of brownish scales, a patch of yellowish ones at bases of last two joints, a narrow pale ring at basal third of long joint and a long patch dorsally at its apical third. Antennæ plumose; last two joints long and slender, rugose, pilose, black, the others short, slender, whitish, with thick black rings at insertions of the hair-whorls; hairs long, dense, black. Coloration similar to the female. Legs with a strong bronzy luster, the tarsal rings obsolete. Wings narrower than in the female, the stems of the fork-cell longer, vestiture sparse. Abdomen elongate, depressed; dorsal pale bands broader than in the female; lateral ciliation long and abundant, brownish. Claw formula, 2.1–2.1–0.0.

Length: Body about 5.5 mm.; wing 4.5 mm.

Genitalia (plate 19, fig. 137): Side-pieces elongate, conical, uniform, without lobes; clasp-filament long, uniform, slightly enlarged at base with a small

Digitized by Google

inserted terminal claw; a rounded lobe within base of side-piece bearing a row of stiff setæ. Harpes simple, curved, with revolute margins. Harpagones small, curved, simple. Unci forming a slender, elongated cone reaching beyond middle of harpes. Basal lobes short, rounded, bearing several setæ.

Larva, Stage IV (see figure of the entire larva, plate 49).—Head square, transverse, a notch at insertions of antennæ, the front margin rounded, flat before; eyes large, transverse. Antennæ large, cylindrical, tapered without, densely spined; a large tuft at outer third; apical setæ very long, two some distance before tip, a long and a short one and a small digit at tip. Upper pair of dorsal head-hairs quadruple, lower pair double; ante-antennal tuft multiple. Mental plate triangular, a central tooth and nine on each side, becoming progressively larger and more remote toward base, except the last two which are very small and distantly spaced. Mandible quadrangular, elongate; two filaments before the tip arising in a thorn-shaped notch with two small hairs; an outer row of cilia from a collar; a row of little tufts along the outer edge arising from slight transverse ridges; dentition of four teeth on a process, the first the largest, with two sharp teeth without, a small tooth at base, a slender filament and a long row of feathered hairs within; a long conical tooth below; further below a furcate process bearing tufts of hair; basal angle long and slender; a long row of hairs toward the base. Maxilla conical, divided by a suture; inner half hairy toward base, and a group of stiff hairs at middle; a tuft of very long hairs at apex running along the suture, outer half with hair toward the suture, the two filaments small. Palpus small, with four terminal digits, the two next the maxilla longest. Thorax rounded, wider than long; hairs abundant, very long, the anterior prothoracic tufts exceeding the head. Anterior abdominal segments short, posterior ones elongated; lateral tufts of first two segments multiple, a single long hair on third to sixth, not shorter posteriorly, very short on seventh segment. Tracheal tubes narrow, linear, angled in the eighth segment. Air-tube long, slender, straight, scarcely tapered, about six times as long as wide; pecten of few teeth on basal fourth, the single teeth a short spine with very broad base and four long basal spines; no hairs on the tube. Lateral comb of eighth segment of numerous scales in a very large triangular patch, the single scales with broadly expanded apex fringed with short spines. Anal segment nearly twice as long as wide, ringed by the plate; dorsal hairs a tuft and long hair on each side; a single lateral hair; ventral brush well developed, preceded by a row of short tufts along the ventral line to the base and arising from little holes in the chitin. Anal gills slender, about as long as the segment, pointed.

The larvæ occur in cold springs or bogs early in the season, always in small numbers. There is but one annual generation, the larvæ hatching with the melting of the snow and maturing early. The egg is unknown, but probably is deposited singly and the late summer and all winter passed in this stage. The adult is rare, only single specimens being taken, so that its habits are unknown.

Northern New York and New England, westward in Canada, southward in elevated localities.

Center Harbor, New Hampshire, larvæ in an old barrel in swampy spring, May, 1902 (H. G. Dyar); Springfield, Massachusetts, May 21, 22, 23, 24, 27, 28, 29, 1903 (F. Knab); Suffield, Connecticut, May 12, 1903 (F. Knab); Tupper Lake, New York, larva in a cold swamp, adult issued August 16, 1905 (H. G. Dyar); Saxeville, Wisconsin, May, 1910 (B. K. Miller); Kaslo, British Columbia, a larva in a cold springy swamp, May 29, 1903 (H. G. Dyar); Culvers Lake, New Jersey, May 29, 1908 (in collection of J. B. Smith). Also recorded from Branford, Connecticut (E. P. Felt).

Digitized by Google

Genus CARROLLIA Lutz.

Carrollia Lutz, Imprensa Medica, 81, 1905.
Mochlostyrax Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 223, 1906.
Melanoconion Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 23, 1906.
Carrollia Theobald, Mon. Culic., iv, 206, 1907.
Culex Dyar & Knab (in part), Can. Ent., xxxix, 48, 1907.
Culex Williston (in part), Man. N. Am. Dipt., 3 ed., 108, 1908.
Carrollia Peryassú, Os Culicid. do Brazil, 34, 167, 1908.
Carrollia Dyar & Knab, Can. Ent., xli, 101, 1909.
Carrollia Theobald, Mon. Culic., v, 113, 1910.

The type of *Carrollia* Lutz is *Carrollia iridescens* Lutz.

GENERIC DIAGNOSIS OF ADULT:

Palpi short in the female, long in the male. Antennæ filiform; joints subequal in the female, with basal whorls of rather sparse hairs on the joints; all but the last two joints shortened in the male and with a curved raised rim bearing the hair-whorl, the whorls long, dense, appearing plumose. Proboscis moderate, slightly enlarged at the apex. A pair of coarse vertical bristles projecting between eyes. Prothoracic lobes very small, lateral. Mesonotum without longitudinal rows of coarse setæ on the disk. Scutellum trilobate. Postnotum nude. Abdomen subcylindrical, truncate at the tip in the female, laterally compressed, the cerci short and inconspicuous; in the male slightly expanded at the tip, laterally compressed, without lateral ciliation. Legs moderate; claws equal and simple in the female, unequal and some of them toothed in the male. Wing of the male somewhat narrower than that of the female; basal cross-vein remote from anterior cross-vein. Male genitalia with the essential characters of *Culex*.

GENERIC DIAGNOSIS OF LARVA:

Head rounded, flattened; antennæ moderate, with the tuft near middle, without a notch at its origin. Air-tube over three times as long as wide, with many hair tufts along posterior margin; pecten present in two rows at base of tube. Lateral comb of eighth abdominal segment of few scales in a single row. Anal segment completely ringed by a chitinous band in last stage; ventral brush well developed, limited to the barred area. Anal gills normal.

Tropical America, exclusive of the Antilles.

The genus possesses all the essential characters of *Culex*. It differs therefrom by reduction of the setæ on the disk of the mesonotum and the compressed abdomen. It might be considered only a section of *Culex*, and its relationship is clearly with the species-group of that genus breeding in Bromeliaceæ; but we have concluded to use it in a generic sense for the two following aberrant species:

SYNOPSIS OF THE SPECIES.

ADULTS, STRUCTURE AND COLORATION.

1. Hind tarsi without white rings; abdomen with dorsal bands ..... *iridescens* Lutz (p. 462)
   Hind tarsi with a white ring on the fourth joint; abdomen without bands ..... *urichii* Coquillett (p. 464)

ADULTS, MALE GENITALIA.

1. Lateral process of the side piece very long and columnar, without other appendages between it and the apex; clasp filament divaricate and hirsute ..... *iridescens* Lutz (p. 464)
   Lateral process of the side-piece long and slender, with many broad spatulate appendages between it and the apex; clasp filament swollen at the tip, simple ..... *urichii* Coquillett (p. 466)

LARVÆ.

NOTE.—The larvæ are included in the table of larvæ of *Culex*, and are here repeated.

1. Air-tube with nine or ten tufts along the posterior line.. *iridescens* Lutz (p. 464)
   Air-tube with about fifteen hair tufts along the posterior line ..... *urichii* Coquillett (p. 466)

Digitized by Google

CARROLLIA IRIDESCENS Lutz.

Carrollia iridescens Lutz, Imprensa Medica, p. 81, 1905.
Carrollia iridescens Theobald, Mon. Culicid., iv, 207, 1907.
Culex (*Carrollia*) *iridescens* Busck, Smiths. Misc. Colls., quart. iss., lii, 70, 1908.
Carrollia iridescens Peryassú, Os Culicid. do Brasil, 167, 1908.

ORIGINAL DESCRIPTION OF CARROLLIA IRIDESCENS:

(MACHO): Comprimento total cerca de 5 mm., sem a tromba que mede quasi 3 mm.

Tromba—Do tamanho do abdomen, fina, mas com o apex muito entumescido, coberta de escamas pretas e pellos finos espaçados, maiores e menores, mais abundantes nos labellos que têm o apex amarellado; do lado de baixo, principalmente na base, as escamas são um pouco mais claras com reflexos de bronze e azul metallico; na raiz da tromba, do lado ventral, ha alguns pellos maiores.

Palpos—Um pouco mais curtos do que a tromba, finos, cobertos de escamas escuras e pellos finos, com 4 articulos compridos, dos quaes o 2º é um pouco maior do que o 1º e este quasi igual ao 3º e 4º; além destes parece haver um pequeno articulo basal; não ha pellos maiores nos tres primeiros segmentos, nos ultimos ha bastantes pellos esparsos um pouco maiores no apex do 5º; não formam um tufo distincto e comprido como se observa no culex.

Antennas—Um pouco menores do que os palpos, muito plumosas, os verticillos escuros, os pellos finos, os ultimos dois articulos esbranquiçados, flagello com brilho branco, os ultimos dois articulos alcançam mais de um terço do comprimento. Torus, em parte ochraceo, em parte com côr de chumbo velho.

Clypeus—Côr de chumbo escura.

Occiput—Fundo preto, coberto de escamas obovaes e espatuladas, imbricadas, dirigidas para cima e para diante; estas escamas têm reflexos iridescentes roseos, lilaceos, bronzeados e branco-nacarados; no meio e para traz ha escemas douradas erectas, compridas e bifurcadas; dos lados as escamas são todas chatas, da mesma côr que as do centro.

Lobulos prothoracicos—Escuros, brilho prateado e pellos castanhos com brilho dourado.

Mesonotum—Fundo preto com brilho prateado, escamas fusiformes, estreitas, compridas e curvadas, bastante escuras, porém com brilho de ouro baço.

Scutellum—Coberto de escamas semelhantes sobre fundo mais claro, ochraceo esverdeado, tendo de cada lado e no meio 4 pellos compridos e grossos com brilho de ouro.

Pleuras—Fundo preto, com algumas manchas de brilho prateado, nas quaes se vê um pequeno numero de escamas obovaes esbranquiçadas.

Metanotum—Preto, com brilho prateado, sem pellos e escamas.

Abdomen—Lateralmente comprimido; o 1º segmento muito estreito e bastante saliente; os ultimos segmentos, a começar do 5º, com a margem apical saliente em baixo, de modo a formar uma especie de escada; esta é mais marcada no 7º segmento, cuja base no sentido dorso-ventral mede apenas a metade do apex do 6º; o abdomen em cima está coberto de escamas pretas, com reflexos metallicos de côr rosea e azul escura; ha cintas basaes claras do 2º até o 7º segmento, estreitas no meio e dilatadas nos lados, formando manchas de forma pouco regular; em baixo ha no meio cintas basaes claras, continuando-se dos lados em triangulos, cuja base é apical, ficando entre estes e as manchas do lado dorsal uma estria preta, correndo diagonalmente da base ventral para o apex e do ventre para o dorso; a parte apical dos segmentos é toda preta; as escamas claras são furta-côres, apresentando reflexos brilhantes, dourados, vermelhos, azues, roxos e lilaceos; os pellos apicaes dos segmentos são dourados; o 8º segmento é um pouco dilatado e só tem escamas pretas bastante compridas; o ultimo segmento, de côr preta, é quasi escondido por pellos dourados e tem uma pinça de côr amarella bastante ennegrecida.

Pernas—As coxæ e os trochanteres são de côr ochracea clara, um pouco esverdeada, com brilho branco, contrastando com a côr escura da metade dorsal das pleuras e do metanotum; os femora têm a base e quasi toda a face ventral de côr ochracea clara; pelo resto são escuras, com excepção de algumas manchas claras, de iridescenia igual á do abdomen; destas ha duas na face anterior do femur medio: uma no meio e outra sub-apical na face anterior do ultimo femur; todos os joelhos são marcados em cima com um ponto branco; o ultimo apex da tibia e, em geral, a face inferior das pernas são de côr mais clara com reflexos pallidos de ouro e bronze; os 4 pés anteriores têm as unhas desiguaes, com dente na base; os ultimos têm unhas iguaes, pequenas e inermes; os femora, principalmente os dos pares anteriores, são lateralmente comprimidos e torcidos no meio; nos femora e tibiæ ha muitos pellos dourados compridos, parecendo espinhos.

Digitized by Google

Azas—Algumas escamas lateraes estreitas, em forma das de culex, sendo, porém, na maior parte obovaes como as de tæniorhynchus; as escamas no apex são muito aconchegadas, lembrando as azas de melanoconion; primeira cellula forqueada, 4 vezes mais comprida que o pedunculo correspondente; a segunda, quasi igual ao pedunculo; as veias *a* e *b* formam um angulo obtuso, aberto para a base da qual *c* se approxima por mais de 2 vezes o seu comprimento; as escamas na costa e na primeira veia longitudinal, como tambem a maior parte da 5ª nervura, são mais escuras e têm reflexo de bronze; as outras são cinzentas; as escamas compridas da margen das azas são mais escuras no apex, tornando-se gradualmente mais claras na direcção da base.

A femea se distingue pelas antennas menos plumosas, os palpos mais curtos, as unhas iguaes e pelos caracteres sexuaes.

NOTA.—A descripção é feita de exemplares criados de larvas encontradas em agua de taquára na serra da Cantareira, perto de S. Paulo.

E' uma especie muito bonita e caracteristica.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CARROLLIA IRIDESCENS:

Female.—Proboscis slender, long, slightly swollen at tip, the labellæ conically tapered; vestiture black with a blue reflection, setæ rather coarse, longer than usual, black, sparse. Palpi slender, one-fifth as long as proboscis, black. Antennæ moderate, joints subequal, rugose, coarsely pilose, black; hairs of whorls moderate, sparse, black; tori subspherical, with a cup-shaped apical excavation, luteous brown, silvery-blue pruinose. Clypeus rounded triangular, blackish brown, nude. Eyes black. Occiput densely clothed with broad, flat, subtruncate appressed scales, even on vertex, pale bronzy brown with an iridescent reflection, and short, erect, brown forked scales with a golden reflection, broader and very dense on the nape; a pair of coarse brown bristles projecting between eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with dark-brown scales and black bristles. Mesonotum black, densely clothed with narrow, curved bronzy-brown scales roughened by broader, intermixed suberect ones and coarse pale ones around the ante-scutellar space. Scutellum trilobate, clothed with brownish yellow scales similar to those on mesonotum, each lobe with a group of dark bristles. Postnotum elliptical, prominent, dark brown, nude. Pleuræ deep black on upper half, coxæ and their insertions pale luteous, a strong pearly violaceous reflection above, leaving an oblique median black bar, elliptical yellowish-silvery scales on coxæ and pleuræ below, and rows of dark bristles.

Abdomen compressed, somewhat expanded apically, truncate at tip; dorsal vestiture deep black, segments with narrow basal yellowish-white bands, narrowly separated at sides from a row of large lateral, basal, segmental, rounded triangular, grayish-white patches which have a silvery-violet reflection in certain lights; first segment with a large patch of black scales and with fine hairs; venter yellowish-silvery scaled, tips of last three segments black scaled, roughened; apex of abdomen broad, bristly.

Wings rather narrow, hyaline; petiole of second marginal cell one-fourth as long as its cell, that of second posterior cell nearly as long as its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins dense, moderately long, elliptical, intermixed with some long ligulate ones, especially on fifth vein, dull brown, with a blue reflection on the costa. Halteres with whitish stems and black knobs.

Legs moderate, black scaled with bronzy reflection; femora yellowish white at base and beneath to near apices, a pair of large spots on outer side of mid and hind femora white with a violet reflection, one near middle, the other towards apex; knees narrowly whitish scaled; tibiæ with scales somewhat roughened, hind pair with a pale line on inner side; tarsi with a bronzy reflection beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3.5 mm.

Digitized by Google

Male.—Proboscis gradually swollen towards tip, straight. Palpi slender, nearly as long as proboscis, nearly uniform, with black setæ at apex of long joint and on last two joints, black scaled, a narrow pale ring before middle of long joint. Antennæ rather long, sparsely plumose; last two joints long and slender, rugose, pilose, black, the others shorter, but rather longer than usual, whitish, with black rings at insertions of hair-whorls; hairs long, not very dense, brown. Coloration as in female. Wings scarcely narrower than in the female, the stems of the fork-cell very little longer, vestiture about the same. Abdomen compressed, with dorsal yellowish bands, as in the female; setæ at ends of segments coarse, yellowish; no lateral ciliation. Claw formula, 1.0–0.0–0.0.

Length: Body about 4 mm.; wing 3 mm.

Genitalia (plate 10, fig. 66): Side-pieces over twice as long as broad, tips conically tapered; lateral process arising from near middle, long, rather thick, columnar, bearing at tip three closely united leaf-like expansions; clasp-filament enlarged at tip, with a rounded excavation above crossed by a spine, from base of which another spine projects; apex extending beyond excavation, hirsute, with a terminal spine. Harpes with a slender inner area bearing a short comb of teeth at its tip, other plates of harpes and harpagones comparatively few and simple. Basal appendages small, each with three hairs.

Larva, Stage IV (plate 113, fig. 384).—Head subquadrate, rounded, about as wide as long, sides flat; antennæ slender, rather long, uniform, with a minute tuft beyond middle; hooks on labrum large; dorsal head-hairs forming a nearly straight row across between antennæ, the upper pair multiple, the lower pair in fours, the ante-antennal tuft multiple. Body with the skin glabrous; lateral hairs of abdomen in fours on first segment, in twos on second, single on third to sixth segments. Comb of eighth segment of six to eight single spines in a straight row. Air-tube about seven times as long as wide, tapering to tip; pecten of three to six short teeth near base of tube; a row of nine hair-tufts along posterior margin, formed of two approximated series, none near base or apex, but a very minute tuft towards apex and another on dorsal aspect. Anal segment longer than wide, ringed by the plate; dorsal tuft of four hairs of different lengths on each side; ventral brush well developed, confined by the chitinous ring. Anal gills about twice as long as the segment, ensiform.

All our larvæ were found in bamboo-joints that had been artificially prepared to catch rain water. They probably normally occur in water in broken bamboos, as Dr. Lutz describes their occurrence in such locations in Brazil.

Central America to southern Brazil.

Tabernilla, Canal Zone, Panama, May 21, 22, June 17, July 18, 1907 (A. Busck); July 24, 30, August 14, 28, December 15, 1908 (A. H. Jennings). Also reported from Pará, Rio de Janeiro and São Paulo, Brazil (Lutz, Theobald, Peryassú).

CARROLLIA URICHII (Coquillett) Dyar & Knab.

Melanoconion urichii Coquillett, Can. Ent., xxxviii, 61, 1906.
Mochlostyrax urichii Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 223, 1906.
Mochlostyrax urichii Dyar, Proc. Ent. Soc. Wash., viii, 18, 1906.
Melanoconion urichii Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 23, 1906.
Carrollia urichii Dyar & Knab, Can. Ent. xli, 101, 1909.
Melanoconion (?) *urichii* Theobald, Mon. Culic., v, 458, 1910.

ORIGINAL DESCRIPTION OF MELANOCONION URICHII:

Proboscis and palpi black scaled, occiput yellow scaled. Thorax thinly black scaled, the median part of the posterior half chiefly yellow scaled, the bristles on this part and on the scutellum yellow. Abdomen black scaled, the venter with a row of large violet spots on either side of segments from two to six, the middle of the venter golden-yellow scaled except on the narrow hind margins of the last four segments. Legs black scaled, with a purplish tinge, the under side of the femora,

Digitized by Google

at least basally, yellow scaled, a large patch of violet scales before the apex of the front side of each femur, fourth joint of hind tarsi white scaled (the fifth is wanting); tarsal claws simple. Wings hyaline, somewhat smoky along the costa, the scales black, with a purplish tinge, those in outer half of wings rather broad, oblanceolate. Length about 4 mm.

Trinidad, West Indies. A female specimen collected by Mr. F. W. Urich, after whom this fine species is named. Type No. 9141, U. S. National Museum.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CARROLLIA URICHII:

Female.—Proboscis rather long and slender, enlarged towards apex, labellæ conically tapered; vestiture black with a blue and bronzy reflection; setæ minute, curved black, those on labellæ more prominently outstanding. Palpi slender, short, black, one-fifth as long as proboscis, with some outstanding setæ at base. Antennæ slender, the joints subequal, rugose, pilose, black, second joint scarcely enlarged but somewhat elongated; tori subspherical, with a cup-shaped apical excavation, pale yellow; hairs of whorls sparse, moderate, black. Clypeus rounded, convex, black, pruinose. Eyes black. Occiput black, vertex densely clothed with a mass of forked, erect pale-yellow scales extending well down the sides, cheeks and eye-margins clothed with broad, flat, silvery white scales; coarse brown bristles along eye margins, a pair of long ones projecting between the eyes.

Prothoracic lobes elliptical, remote dorsally, clothed with rather broad erect black scales with a bronzy luster and a few black bristles. Mesonotum blackish brown, with two narrow bare lines on anterior half, vestiture of dense, long, narrow curved scales, blackish brown, with longer, dense, suberect, brighter brown scales on median portion of disk and around ante-scutellar space, making the vestiture look roughened; bristles over roots of wings brown. Scutellum trilobate, blackish, the mid lobe large, clothed with pale brown scales similar to those on mesonotum, each lobe with a group of brown bristles. Postnotum elliptical, brown, nude. Pleuræ brown, with a silvery pruinosity on the upper half and bordered below by a broad, oblique, velvet-black band; coxæ yellowish with a green tint, with a row of dark bristles outwardly and some silvery scales.

Abdomen compressed, truncate at tip, clothed dorsally with black scales with a strong iridescent metallic reflection, sides black without metallic luster; a row of large, lateral, triangular, segmental white spots with a metallic violaceous reflection, which do not reach the margins; venter clothed with yellowish-white silvery scales, the tips of the last four segments with narrow, deep black bands of raised scales.

Wings rather narrow, hyaline; petiole of second marginal cell about one-fourth as long as its cell, that of second posterior cell about equal to its cell; basal cross-vein distant more than its own length from anterior cross-vein; scales of veins brown, with a blue reflection on the costa, rather broadly ovate, dense. Halteres white, with black knobs.

Legs slender; femora black above, with metallic blue reflection laterally, whitish beneath basally, scales roughened towards tip, a violaceous iridescent spot on outer side before apex; knees narrowly silver scaled; tibiæ bronzy black with brilliant iridescent luster, scales on posterior tibiæ somewhat outstanding; tarsi bronzy black, the hind tarsi with a pale shade at base beneath and the fourth joint white on its basal half; under surface of front and mid tarsi with a strong bronzy luster. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Male.—Palpi nearly as long as proboscis, slender, uniform, last joint tapered; vestiture black, a white ring before middle of long joint, a few short black hairs on ends of the last two joints and tip of long joint. Antennæ rather long, plumose; last two joints long and slender, rugose, pilose, black, the others short, but longer than usual, whitish, with a black ring at insertions of hair-whorls;

Digitized by Google

hairs long, moderately dense, brown. Coloration similar to the female. Wings narrower than in the female, the stems of the fork-cells longer, vestiture about the same. Abdomen compressed basally, tip expanded; setæ at apices of segments coarser than in the female, no lateral ciliation; the eighth segment with a median dorsal patch of silvery-violaceous scales. Claw formula, 1.0–1.0–0.0.

Length: Body about 4 mm.; wings 4 mm.

Genitalia (plate 10, fig. 65): Side-pieces over twice as long as wide, tips conically tapered, outwardly to subapical ridges bearing ten narrow leaf-like appendages, a long slender peduncle below middle bearing two filaments and a seta. Clasp-filament large, strongly swollen at apex, bearing a short seta and a small articulated terminal spine. Harpes divided, branches at right angles, equal, the outer bearing a few teeth. Harpagones nearly simple, outer portion slender, bent, obscurely divided. Basal appendages small, remote, and setose.

Larva, Stage IV (plate 113, fig. 383).—Head rounded, narrowed before eyes, a notch at insertion of antennæ, front margin arcuate. Antennæ slender, cylindrical, hardly swollen toward base, very weakly spined basally, almost smooth; a double hair before middle; four short setæ and a digit at tip. Mental plate elongate triangular, with a long central tooth and ten on each side, basal ones rather widely spaced and continuing down the steep part of lateral margin to base. Mandible quadrangular, outer margin oblique; three long filaments and a short one before tip; a row of cilia from a collar; a row of long oblique tufts from short thick pedicels on outer margin; dentition very small, of four teeth on a process, the first and fourth longest; two small teeth at base, two curved serrate filaments and three feathered hairs within; process below stout, widely furcate, a row of hairs on each limb, the lower one running diagonally to base; basal angle obsolete; four long hairs within and three small ones at base. Maxilla irregularly spherical, divided by a suture; inner half with two rows of stout spines with feathered tips, two rows of cilia, and a long stout process which divides near base, limb again shortly divided near tip, all the ends finely cleft; a row of long hairs at tip on suture; outer half with two short filaments next the suture and some hairs outwardly. Palpus moderate, with four long straight digits. Thorax and abdomen moderate, hairs moderately developed; lateral abdominal hairs single after second segment. Tracheæ broad, band-shaped. Air-tube conically tapered, about five times as long as wide, a black ring at the base; pecten of about twelve teeth, not reaching one-third of tube; single spine slender, fringed along one side with a uniform straight pectination of fine spinules; sixteen large hair-tufts along posterior margin of tube, inserted nearly in a line. Lateral comb of eighth segment of about fifteen long bar-like spines in a straight row, single spines finely fringed with spinules. Anal segment about as long as broad, ringed by the plate; dorsal tuft a long hair and brush on each side; a single lateral hair; ventral brush well developed, confined to the barred area. Anal gills about twice as long as the segment, taper-pointed.

The larvæ live in the water in open bamboo-joints. Mr. Urich says that it is often found associated with *Orthopodomyia fascipes* and occurs under the same conditions. "The predominating color is brown. During life, the similarity of these two larvæ is marked."

Island of Trinidad, West Indies, probably extending into Brazil.

St. Ann's valley, Trinidad, January, 1906 (F. W. Urich).

Genus LUTZIA Theobald.

Lutzia Theobald, Mon. Culic., iii, 155, 1903.
Lutzia Lutz in Bourroul, Mosq. do Brasil, 59, 1904.
Taeniorhynchus Giles (in part), Journ. Trop. Med., vii, 381, 1904.

Digitized by Google

Lutzia Blanchard, Les Moustiques, 394, 1905.
Lutzia Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 178, 180, 1906.
Lutzia Theobald, Gen. Ins., Dipt., Fasc. 26, 15, 24, 1905.
Lutzia Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 16, 1906.
Lutzia Dyar & Knab, Canad. Ent., xxxix, 48, 1907.
Lutzia Theobald, Mon. Culicid., iv, 151, 1907.
Lutzia Peryassú, Os Culic. do Brazil, 35, 1908.
Lutzia Williston, Man. N. A. Dipt., 3 ed., 108, 1908.
Lutzia Pazos, San. y Ben., ii, 40, 43, 1909.
Lutzia Theobald, Mon. Culic., v, 116, 1910.

The type species of *Lutzia* Theobald is *Culex bigoti* Bellardi.

GENERIC DIAGNOSIS OF ADULT:

Proboscis moderate. Palpi of female rather short, one-third or less the length of proboscis; palpi of male long, acuminate, exceeding proboscis, densely hairy. Antennæ of female slender, with the joints subequal, with basal whorls of sparse delicate hairs; of the male densely plumose, the two terminal joints long, the others short and enlarged at insertions of hair whorls. Prothoracic lobes well separated; scutellum trilobate; postnotum nude. Abdomen subcylindrical, truncate at tip in female, long and depressed in male. Legs slender, rather long; empodia of the tarsi large, well-developed; claws of female simple, of male unequal and toothed on front and middle legs.

GENERIC DIAGNOSIS OF LARVA:

Head rounded, flattened, broadest posteriorly. Antennæ small; mouth parts adapted for predaceous habit; the maxillæ quadrangular; the mouth brushes on prominent lobes, of smooth chitinous lamellæ, hooked at apices. Air tube long, with a series of tufts and basal pecten. Eighth segment with a lateral comb of many spines. Anal segment ringed by the plate; ventral brush well developed.

Tropical America, except the West Indies and the arid regions.

The eggs are cylindrical, similar to those of *Culex,* and are laid in boat-shaped masses upon the surface of the water. The larvæ are predaceous on mosquito larvæ, principally upon those species of *Culex* that live in ground-pools of semi-permanent water, and in artificial receptacles of large size. Mosquito larvæ apparently constitute their only food.

Lutzia is developed from *Culex,* and is closely allied thereto. It is only a *Culex* developed for a predaceous habit in the larva; the modification of the mouthparts, at first sight so striking, is really of no fundamental significance. The adults are inseparable from *Culex,* except by the large empodia, which are evidently only an adaptation to enable this large insect to rest upon the surface of the water. The genus, therefore, is a weak one, scarcely more than a section of *Culex.* We have concluded to recognize it on the characters mentioned, for what they are worth. The larvæ are structurally modified for the predaceous habit, the mouth-brushes being inserted upon prominent lobes and transformed into chitinous hooked lamellæ; the series of hair-tufts on the breathing-tube however shows the close relationship with *Culex.* Dr. Lutz first noted the resemblance of these larvæ to those of *Psorophora,* which is striking, both in general appearence and in the modifications of the mouthparts. This latter, however, is without value as indicating relationship, since it is but a similar adaptation to similar habits.

But one species of *Lutzia* has been described; we here add a second from Panama. We suspect that the specimens from South America will prove specifically distinct from those from our region, but we have no material to decide this. Our two forms are very closely related and differ only in details of coloration of the imago. These differences, however, appear to be constant, as we have before us large series of both species and can find no intergrades.

TABLES OF THE SPECIES.

ADULTS, STRUCTURE AND COLORATION.

1. Wings with three spots of yellow scales on the first vein, fifth vein black-scaled near base only..... *allostigma* Howard, Dyar & Knab (p. 471)
   Wings with only two spots on first vein, black of fifth vein involving base of the fork..... *bigoti* Bellardi (p. 468)

Digitized by Google

MALE GENITALIA.

1. Harpagones subquadrate, distally with three large curved teeth
allostigma Howard, Dyar & Knab (p. 472)
Harpagones conical, taper-pointed, with a series of small teeth on inner margins ..... *bigoti* Bellardi (p. 469)

LARVÆ.

1. Pecten of 7–9 teeth, well separated and extending far beyond middle of tube
bigoti Bellardi (p. 470)
Pecten of 10–12 teeth, not extending much beyond middle of tube
allostigma Howard, Dyar & Knab (p. 472)

LUTZIA BIGOTI (Bellardi) Theobald.

Culex bigoti Bellardi, Mem. Acc. Sc. Torino, xxi, 200, 1862.
Culex bigoti Osten Sacken, Smiths. Misc. Colls., xvi, 19, 1878.
Culex bigotii Giles, Gnats or Mosq., 209, 1900.
Culex bigotii Theobald, Mon. Culic., i, 343, 1901.
Culex bigotii Giles, Gnats or Mosq., 2 ed., 390, 1902.
Lutzia bigotii Theobald, Mon. Culic., iii, 155, 1903.
Lutzia bigotii Lutz, in Bourroul, Mosq. do Brasil, 38, 1904.
Taeniorhynchus bigotii Giles, Journ. Trop. Med., vii, 382, 1904.
Culex bigotii Blanchard, Les Moustiques, 275, 1905.
Lutzia bigotii Blanchard, Les Moustiques, 394, 1905.
Lutzia bigotii Dyar & Knab (in part), Journ. N. Y. Ent. Soc., xiv, 180, 1906.
Lutzia bigotii Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 22, 1906.
Lutzia bigoti Peryassú, Os Culicid. do Brasil, 45, 182, 343, 1908.
Lutzia bigotii Theobald, Mon. Culic., v, 293, 1910.

ORIGINAL DESCRIPTION OF CULEX BIGOTI:

Femm. *Flavus, flavo-nigro-villosus. Capite fusco, flavo-villoso: antennis fuscis; articulis basalibus antice posticeque flavescentibus: palpis flavis, ad basim nigro-villosis: proboscide longiuscula, flava, ad basim irregulariter nigro-squamosa, ad apicem fusca. Thorace convexiusculo, flavo-fuscescente, dorso obscuriore, flavo-aureo-tomentoso: pleuris flavidis: pectore fuscescente: scutello, metathorace et halteribus flavidis. Abdomine flavo: segmentis omnibus antice transversim late vittatis: vitta e tomento nigro, lata, dorso postice profunde emarginata. Pedibus flavidis, nigro-tomentosis: articulationibus pallidis, non nigro-tomentosis. Alis hyalinis, ad marginem anticum flavidis: nervis squamosis: squamis nigris, in tres maculas margini antico et apici contiguas dispositis: squamis intermediis flavidis.*

Lunghezza del corpo 9mm—Lunghezza delle ali 17mm.

Il colore biondo generale del corpo, il tomento nero della porzione anteriore degli anelli dell'addome e le squame nere dei nervi delle ali disposte in tre macchie costituiscono i caratteri proprii di questa specie.

Messico (SALLÉ).
Collezione BIGOT.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF LUTZIA BIGOTI:

Female.—Proboscis moderate, uniform, subcylindrical, labellæ conically tapered; vestiture largely yellowish-white, intermixed with black scales at base, a broad black subapical band. Palpi short, stout, densely hairy, less than one-fourth as long as the proboscis, clothed with black and yellowish-white scales intermixed tending to form bands, some silvery scales apically. Antennæ with basal joints shorter, rugose, pilose, black, second joint longer than third and not swollen, basal joints pale at their tips; tori subspherical, with a cup-shaped apical excavation, brown, with a group of yellowish-white scales on inner side; hairs of whorls sparse, short. Clypeus rounded triangular, prominent, dull brown, nude. Eyes black. Occiput brown, with a few narrow, curved scales, most of the vestiture of erect, forked ochraceous scales, a black spot on each side, margins of eyes and cheeks yellowish white scaled; a row of short brown hairs along margin of eyes, a short tuft of shining yellow ones projecting on the vertex.

Prothoracic lobes elliptical, remote dorsally, clothed with hair-like pale-yellow scales and numerous dark bristles. Mesonotum brown dorsally, shading to testaceous on the sides, rather sparsely clothed with narrow, curved, pale-golden scales, short pale bristles dorsally and longer ones on sides; anterior

Digitized by Google

edge marked by two narrow, bare impressed lines which are faintly continued backward. Scutellum trilobate, with pale-yellow narrow scales, each lobe with a large group of pale bristles. Postnotum elliptical, luteous, nude. Pleuræ and coxæ luteous, with patches of narrow scales, yellowish above, white below, and rows of short brown bristles, a few black scales on coxæ; pleuræ with dark-brown integumentary spots.

Abdomen subcylindrical, truncated posteriorly; clothed dorsally with black scales, each segment, except the first, with a large apical subquadrate yellowish-white patch joined to a narrow posterior margin of the same color; last segment with narrow, pale apical margin and a median triangular patch dividing the dark area; first segment with a patch of dark scales and many pale hairs; a row of lateral, oblique, elongated, basal segmental white patches; venter yellowish scaled, each segment marked with a V-shaped black band, the point at base of segment on medio-ventral line.

Wings rather narrow, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell a little longer than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales black and pale yellow in patches, the yellow as follows: three spots on costal vein, first very long, third subapical; two spots on first vein, the first opposite the end of first costal spot and much shorter, the second at apex of vein; a long spot near end of upper fork of second vein; a very long spot on third vein; a small one on upper fork of fourth vein, a dot at base of lower fork of fourth vein and at its apex; both forks of fifth vein yellow except at base; sixth vein yellow with a black spot before tip and another near base; fringe checkered black and white, the white spots mainly at terminations of veins; outstanding scales of veins dense, narrowly ligulate. Halteres entirely pale.

Legs rather long and slender; vestiture brownish black; femora pale at base and beneath, apex broadly yellowish; tibiæ broadly sordid yellow at base, narrowly so apically, an ochraceous line along under side, not continued to apex on posterior ones; tarsi with a yellowish-white ring at base and apex of each joint, scales between bluish black; front and mid tarsi with last joint black; that of hind ones yellow. Claw formula, 0.0–0.0–0.0.

Length: Body about 6 mm.; wing 6 mm.

Male.—Proboscis longer than in the female, nearly straight, black scaled, the tip narrowly and a broad ring beyond middle yellowish scaled. Palpi exceeding the proboscis by less than the length of the last joint, last joint pointed, penultimate joint somewhat thickened; terminal two-thirds of long joint and last two joints densely clothed with long brown and yellowish hairs; scale-vestiture predominatingly of ochreous yellow, the long joint with two blackish rings before middle and another before apex, penultimate joint with a black ring at middle, last one with a patch of black scales near base. Antennæ plumose; last two joints long and slender, rugose, pilose, blackish, the others short, slender, pale, each with a sinuous, enlarged black ring at insertion of hair-whorl; hairs long, dense, fine, yellowish and brown, pile on penultimate joint produced into long delicate hairs. Coloration similar to the female. Abdomen long, slender, depressed; dorsal apical spots much larger than in the female, subtriangular, lateral white ones tending to form basal bands; last segment entirely yellow and white scaled; lateral ciliation long and abundant, fine, pale yellow. Wings narrower than in the female, the stems of the fork-cells a little longer; vestiture sparse. Last tarsal joint of front legs yellow scaled. Front and mid-tarsal claws unequal; claw formula, 1.1–1.1–0.0.

Length: Body about 7 mm.; wing 6 mm.

Genitalia (plate 9, fig. 64): Side-pieces more than twice as long as broad, tips conically tapered, marginal appendages of three stout spines and four smaller

Digitized by Google

ones situated below middle of side-piece articulated in a line. Clasp-filament moderate, curved, slightly enlarged at base, with a small articulated terminal appendage. Harpes single, stoutly columnar bearing a tuft of divergent spines at tip. Harpagones broad, tapering to the pointed tip, with a series of small teeth on inner margins. Unci contiguous, with simple and revolute margins, forming a large basal cone. No basal appendages.

Larva, Stage IV (plate 113, fig. 385).—Head quadrate, slightly wider than long, broadest posteriorly. Antennæ small, cylindrical, slightly tapered, smooth; a long double hair at middle; three long setæ, a short seta and a digit at tip. Eyes large, pointed. Mouth-brushes of chitinous lamellæ inserted on anterior lobes of head, folded downward and backward. Mental plate semicircular, excavate behind, with a central tooth and seven on each side, all about alike and equally spaced, except the last which is small. Mandible much reduced, elongate quadrangular, the dentition occupying most of the terminal area; a very small filament before tip, outer row of cilia short, coarse, appressed to dentition; dentition large, of five teeth, the first, third and fifth longer; an area of confluent spines below; basal angle obsolete; a small process with a tuft of hairs; a row of fine hairs within. Maxilla quadrangular and divided by a band-shaped suture, inner half somewhat produced; inner half with a long row of cilia, a tuft of stout spines at tip; outer half with a tuft of spines adjoining apical tuft and a single long spine; two small filaments near center; a row of short teeth next the palpus. Palpus short, stout; five minute digits at tip. Skin of body distinctly spicular. Thorax rounded, about as long as wide; hairs moderate, short. Abdomen stout, segments transverse; lateral hairs of first two segments multiple, double on third and fourth, single and very fine on fifth. Air-tube stout, conically tapered outwardly, about four times as long as wide, the surface finely spicular; pecten reaching well beyond middle of tube, of stout, well-separated spines; single spine a simple spine with excavate base; a partly double row of hair-tufts, from base almost to apex of tube; a black band around base of tube. Lateral comb of eighth segment of many scales in a large patch; single scale elliptical, often broader without, fringed with spinules; apical spines longest. Anal segment much longer than wide, ringed by the plate, which is obliquely excised below; dorsal hairs two on each side; a single lateral hair; ventral brush well developed, the barred area reaching halfway to base. Anal gills very small, slender, in a small group distally on segment.

The larvæ are predaceous upon the larvæ of other mosquitoes, principally of the genera *Culex* and *Aëdes*. They occur in puddles and other collections of water of not too transient a nature. Mr. Knab found the larvæ in large street puddles of rain water at Córdoba, Mexico, where they were preying upon the larvæ of *Culex coronator*. Also in water in depressions on large bowlders in the stream-bed of the Rio San Antonio, where they were feeding upon *Culex pinarocampa*. They also occurred in pools in the stream-bed, among rocks, where they preyed upon the larvæ of *Culex* and of *Aëdes euplocamus* and *Aëdes cuneatus*. The adults appear to be diurnal; Knab captured a male flying in the woods on a bright day.

Tropical Mexico to Guatemala.

Córdoba, Mexico, June 13, 1905; January 16 and April 8, 1908 (F. Knab); Peñuela, State of Vera Cruz, Mexico, April 22, 1908 (F. Knab); Guatemala City, Guatemala, 4800 feet, September, 1902 (G. Eisen); Trece Aguas, Alta Vera Paz, Guatemala, March 29, 1906 (O. F. Cook).

We have included in our references for *Lutzia bigoti* the literature dealing with Brazilian specimens, although we believe that these will prove to represent one or more distinct species. We have before us a male and female collected by

Digitized by Google

Dr. A. Lutz in São Paulo which agree with Mexican specimens in every respect. As, however, there is a wide intervening territory occupied by another species it seems unlikely to us that the two forms are conspecific. Theobald figures the wing of a specimen from Pará, Brazil (Mon. Culic., iii, 156, fig. 84, 1903). In this the first vein apparently has a third spot, like our species from Panama, but otherwise the wing-pattern closely resembles that of *Lutzia bigoti* as here restricted. The type of *Lutzia bigoti* was collected by Sallé in Mexico, probably at Córdoba where this naturalist collected most of his material.

LUTZIA ALLOSTIGMA, new species.

Lutzia bigotii Dyar and Knab (in part), Journ. N. Y. Ent. Soc., xiv, 180, 1906.
Lutzia bigotii Coquillett (in part), U. S. Dept. Agr. Bur. Ent., Tech. Ser. 11, 22, 1906.
Lutzia bigotii Busck (not Bellardi), Smiths. Misc. Colls., quart. iss., iii, 66, 1908.
Lutzia bigotii Jennings (not Bellardi), Can. Ent., xli, 49, 1909.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF LUTZIA ALLOSTIGMA:

Female.—Proboscis moderate, uniform, subcylindrical, labellæ conically tapered; largely yellowish-white scaled, intermixed with black scales at base, a broad black subapical band, labellæ pale. Palpi short, stout, densely hairy, nearly one-third as long as proboscis, clothed with black scales, a ring and the apex yellowish-white scaled and some silvery scales apically. Antennæ with basal joints shorter, rugose, pilose, black, second joint longer than third and not swollen, basal joints pale at their tips; tori subspherical, with a cup-shaped apical excavation, brown, with a group of yellowish-white scales on inner side; hairs of whorls sparse, short. Clypeus triangularly rounded, prominent, dull brown, nude. Eyes black. Occiput brown, with a few shining, whitish, narrow curved scales, most of vestiture of dense, erect forked, ochraceous scales extending well down the sides, margins of eyes and cheeks whitish scaled, a row of shining yellowish hairs along margin of eyes and forming a short projecting tuft at the vertex.

Prothoracic lobes elliptical, remote dorsally, clothed with hair-like pale-yellow scales and numerous pale bristles. Mesonotum brown dorsally shading to testaceous on the sides, rather sparsely clothed with narrow, curved, golden-brown and pale-golden scales, the pale scales forming a broad irregular lateral and anterior margin, striæ about the ante-scutellar space and a pair of discal dots; short pale bristles dorsally and longer ones on sides; anterior edge marked by two narrow bare impressed lines which are faintly continued backward. Scutellum trilobate, each lobe with a large tuft of bristles, and pale-golden narrow scales. Postnotum elliptical, luteous, nude. Pleuræ and coxæ luteous, with brown spots and patches of narrow scales, yellowish above, white below, and rows of short brown bristles, a few black scales on coxæ.

Abdomen subcylindrical, truncated posteriorly, clothed dorsally with black scales, each except the first segment with a large apical subquadrate yellowish-white patch spreading out on posterior margins of segments; last segment pale scaled with a small discal black patch; first segment with a patch of dark scales and many pale hairs; a row of large lateral oblique elongated basal segmental white patches; venter yellowish scaled, each segment marked with a faint V-shaped dark band, the point toward base of segment on medio-ventral line.

Wings rather narrow, hyaline; petiole of second marginal cell shorter than its cell, that of second posterior cell a little longer than its cell; basal cross-vein distant less than its own length from anterior cross-vein; scales black and pale yellow in patches, yellow as follows: three spots on costal vein, first very long, third small and subapical; three spots on first vein, the first opposite the end of first costal spot and much shorter, the second parallel to second spot of costa, the third near apex of vein, longer than corresponding costal spot; a long spot on

Digitized by Google

upper fork of second vein; a very long spot on third vein to margin; a small one on upper fork and all of lower fork of fourth vein; both forks and outer half of stem of fifth vein white; sixth vein white with a short black spot before tip, and a very long one at base; fringe checkered black and white, white spots at apices of third, lower branch of fourth, upper branch of fifth, and at sixth veins; outstanding scales dense, narrowly ligulate. Halteres entirely pale.

Legs long, rather slender; vestiture brownish black; femora and tibiæ with small spots of pale-yellow scales, bases and apices yellow scaled; all the tibiæ more or less ochreous scaled beneath; tarsi with yellowish-white ring at base and apex of each joint, scales between bluish black; last joint of front tarsi black, that of mid and hind ones white. Claw formula, 0.0–0.0–0.0.

Length: Body about 6 mm.; wing 6 mm.

Male.—Proboscis longer than in the female. Palpi exceeding the proboscis by about the length of the last joint, last joint pointed, penultimate joint somewhat thickened; terminal two-thirds of long joint and last two joints densely clothed with long yellowish hairs; vestiture predominatingly of ochreous yellow scales, the long joint with blackish rings at middle and before apex, penultimate joint with a black ring at middle, last one with a patch of black scales near base. Antennæ plumose; last two joints long and slender, rugose, pilose, blackish, the others short, slender, pale, each roundly enlarged towards a sinuous black ring at insertion of hair-whorl; hairs long, dense, fine, pale brown and yellow; pile on penultimate joint produced into long delicate hairs. Coloration similar to the female. Abdomen long, slender, depressed; dorsal apical spots broader than in the female, lateral ones tending to form basal bands; last segment entirely yellow and white scaled; lateral ciliation abundant, fine, yellowish. Wings narrower than in the female, the stems of the fork-cells a little longer; vestiture sparse. Last tarsal joint of front legs yellow scaled. Front and mid-tarsal claws unequal; claw formula, 1.1–1.1–0.0.

Length: Body about 7 mm.; wing 5.5 mm.

Genitalia: Side-pieces more than twice as long as broad, tips conically tapered, marginal appendages of three stout spines and four smaller ones situated below middle of side-piece articulated in a line. Clasp-filament moderate, curved, slightly enlarged at base, with a small articulated terminal appendage. Harpes single, stoutly columnar bearing a tuft of divergent spines at tip. Harpagones broad, subquadrate, distally with three large, stout, unequal curved teeth. Unci taper-pointed, with revolute margins, forming a large basal cone and with several teeth below apex. No basal appendages.

Larva, Stage IV.—Head subquadrate, slightly wider than long, broadest posteriorly. Antennæ small, subcylindrical, slightly tapered, smooth; a long double hair at middle; three long setæ, a short seta and a digit at tip. Eyes large, pointed. Mouth-brushes inserted on anterior lobes of head, folded downward and backward. Mental plate semicircular, excavate behind, with a central tooth and seven on each side, all about alike and equally spaced, except the last which is small. Mandible much reduced, elongate quadrangular, the dentition occupying most of the terminal area; a very small filament before tip, outer row of cilia short, coarse, appressed to dentition; dentition large, of five teeth, the first, third and fifth longer; an area of confluent spines below; basal angle obsolete; a small process with a tuft of hairs; a row of fine hairs within. Maxilla quadrangular and divided by a band-shaped suture, inner half somewhat produced; inner half with a long row of cilia, a tuft of stout spines at tip; outer half with a tuft of spines adjoining apical tuft and a single long spine; two small filaments near center; a row of short teeth next the palpus. Palpus short, stout; five minute digits at tip. Skin of body coarsely spicular. Thorax rounded, about as long as wide; hairs moderate, short. Abdomen stout, seg-

Digitized by Google

ments transverse; lateral hairs of first two segments multiple, double on third and fourth, single and very fine on fifth. Air-tube stout, conically tapered outwardly, about four times as long as wide, the surface finely spicular; pecten reaching slightly beyond middle of tube, of a series of about twelve slender teeth, the last ones well separated; single tooth a simple spine with excavate base; a partly double row of moderately long multiple hair-tufts posteriorly, from base almost to apex of tube; a black band around base of tube. Lateral comb of eighth segment of many spines in a triangular patch; single spine elliptical, often broader without, fringed with long spinules. Anal segment longer than wide, obliquely excised below; dorsal hairs two on each side; a single lateral hair; ventral brush well developed, the barred area reaching halfway to base. Anal gills very small, slender, in a small group distally on the segment.

Type. no. 14501, U. S. National Museum.

The larvæ are predaceous upon the larvæ of other mosquitoes, principally of the genus *Culex*. Mr. Jennings has observed the eggs; the following is his account of them and the larvæ:

"On May 30, 1908, while collecting along a rapid mountain stream on the Island of Caldera, Porto Bello Bay, Rep. Panama, I secured several masses of mosquito eggs, which subsequently proved to be those of *Lutzia Bigotii*.

"They were taken from a small pool in the rocky bank of the stream, the water of which was supplied by the stream itself, the pool being nearly filled with vegetable matter consisting of dead leaves, twigs, petals of flowers, seeds, etc.

"Nearly full-grown larvæ of *Lutzia* were present, as well as many of *Anopheles eiseni* and many of several species of Culex, none of the latter, however, being bred.

"The eggs were cylindrical, about one thirty-second of an inch in length, as nearly as could be estimated (no means of accurate measurement being at hand), slender, and terminated in a nearly hemispherical head of the same diameter as the body of the egg, which, however, was drawn to a low point or apex. The body of the rod-like egg was of a pale yellowish-white, with a metallic reflection appearing almost golden in certain lights, while the apex or head, which was sharply defined, was of a pale blue colour.

"The eggs were arranged in a double row, forming a raft or boat. The largest mass contained twenty-five pairs, but with nothing to indicate its original size. Several smaller masses were taken from the same pool, but whether they had formed a part of the same or another raft it is impossible to say.

"The eggs adhered to each other rather tenaciously, and did not become separated by being poured into a collecting vial nor by the rather rough journey back to camp.

"The 'boat' floats low in the water, the rod-like portion being nearly submerged, only the 'head' showing above the surface.

"I should think that these eggs were laid during the night of May 28th.

"At 8 p. m. on May 30th, or presumably 48 hours after being laid, hatching began, the young being easily identified, and showing the characteristic attitude and habits of the larva of this species. They immediately began preying voraciously upon each other, and materially reduced their numbers before the next morning, when they were separated.

"In hatching the young larvæ emerged from the bottom of the egg, the clear yellowish-white colour becoming dark and blackish and the cohesion of the empty cases being lost, the eggs fell gradually apart and the mass finally disintegrated.

"The young larvæ were carefully separated and grew rapidly, increasing by the next morning fully 50 per cent. in length and doubling their size within 24

Digitized by Google

hours. The adults began emerging in ten days from date of oviposition, though an unavoidable lack of food material for a short time may have slightly lengthened the normal time of development."

The larvæ frequent principally ground-pools where their prey occurs in numbers, and consequently feed mostly on larvæ occurring in such situations. Mr. Busck says:

". . . This large yellow species is prevalent on the Zone and comes quickly and unhesitatingly to bite whenever one visits shady places. The predaceous larvæ are found quite as commonly in artificial receptacles of water around human habitations as in shallow pools in the woods. The larva is easily recognized by its size and by the peculiar curved position it assumes, looking as if about to spring upon its prey. The larvæ are unquestionably beneficial in destroying other mosquitoes, though they are not a dependable factor for their control. They are very voracious during their growth, and they have, like the larvæ of *Megarhinus*, the habit of killing all surrounding larvæ before they pupate, so as to have quiet during the pupal period. In many cases I found *Lutzia* larvæ which had completely cleared the receptacle in which they lived of other mosquito larvæ. If the food supply runs short before they are ready for pupation, the *Lutzia* larvæ become cannibalistic, and thus in a measure counteract the value of the species by materially diminishing their own numbers.

"The species was bred from the following localities: From hoof-prints in a meadow near Tabernilla, where the larvæ were feeding upon those of *Uranotænia calosomata;* from an open lagoon south of San Pablo; from a rusty iron bucket near a house at Las Cascadas, with no other mosquito larvæ present; from a small temporary pool near Bohio, without any other mosquito larvæ present; from old French machinery in the woods south of Tabernilla; here again a few full-grown *Lutzia* larvæ alone remained; from larvæ in an old tin-can near a house in Pedro Miguel, feeding on *Stegomyia* larvæ; from large unused sugar-boilers near Tabernilla; here the *Lutzia* larvæ were present by the hundreds, preying upon those of *Culex coronator*. In one of the boilers all the *Culex* larvæ had been eaten and the nearly full-grown *Lutzia* larvæ were feeding upon their weaker companions."

Mr. Jennings found the larvæ in a pool containing large numbers of *Culex* and *Uranotænia*, in a tank associated with *Culex* larvæ, and in a hole in the center of a stump containing rank, highly colored water, associated with larvæ of *Culex*.

Nicaragua to Panama, and probably southward.

Bluefields, Nicaragua (W. F. Thornton); Bocas del Toro, Panama, September 28, 1903 (P. Osterhout); Colon, Panama, July 20, 1907 (A. Busck); Las Cascadas, Canal Zone, Panama (A. H. Jennings); Tabernilla, Canal Zone, Panama, May 2, 1907 (A. Busck); San Pablo, Canal Zone, Panama, May 15, 1907 (A. Busck); Bas Obispo, Canal Zone, Panama, May 16, 1907 (A. Busck); Panama City, Panama (A. H. Jennings); Pedro Miguel, Canal Zone, Panama, November 23, 1907 (A. H. Jennings); Caldera Island, Porto Bello Bay, Panama, May 30, 1908 (A. H. Jennings); Cascajal River, Panama, May 30, 1908 (A. H. Jennings).

Lutzia allostigma has been confused with *Lutzia bigoti*, which it closely resembles. The colorational differences are constant in a large series before us. The male palpi are distinctly longer in this species than in *L. bigoti*.

Genus CULISETA Felt.

Theobaldia Neveu-Lemaire (not *Theobaldius* Nevill), C. R. Soc. Biol., liv, 1331, 1902.
Theobaldia Neveu-Lemaire, Mém. Soc. Zool. Fr., xv, 212, 1902.
Theobaldia Theobald, Mon. Culic., iii, 148, 1903.
Culiseta Felt, Bull. 79, N. Y. State Mus., 391c, 1904.

Digitized by Google

Theobaldia and *Culiseta* Felt, Bull. 97, N. Y. State Mus. 448, 480, 481, 1905.
Theobaldinella Blanchard, Les Moust., 390, 1905.
Theobaldia Theobald, Gen. Ins., 26me Fasciule, 23, 1905.
Theobaldia Aldrich, Cat. N. A. Dipt., Smiths. Misc. Coll., xlvi, 126, 1905.
Theobaldia Dyar, Proc. Ent. Soc. Wash., vii, 45, 48, 1905.
Theobaldia and *Culiseta* Coquillett, Science, n. s., xxiii, 313, 1906.
Theobaldia and *Culiseta* Coquillett, U. S. Dept. Agr., Bur. Entom., Tech. Ser. 11, 16, 22, 1906.
Culiseta Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 178, 203, 1906.
Culiseta Dyar & Knab, Can. Ent., xxxix, 48, 1907.
Theobaldia Theobald, Mon. Culicid., iv, 275, 1907.
Culiseta Theobald, Mon. Culic., iv, 383, 1907.
Pseudotheobaldia Theobald, Mon. Culic., iv, 150, 271, 1907.
Culiseta Williston, Man. No. Am. Dipt., 3 ed., 108, 1908.
Theobaldia Pazos, San. y Ben., ii, 40, 1909.
Culiseta Pazos, San. y Ben., ii, 43, 1909.
Theobaldia Theobald, Mon. Culic., v, 116, 270, 1910.
Pseudotheobaldia Theobald, Mon. Culic., 115, 270, 1910.
Culiseta Theobald, Mon. Culic., 322, 1910.

The type species are: Of *Theobaldia* Neveu-Lemaire, *Culex annulatus* Schrank; of *Culiseta* Felt, *Culex absobrinus* Felt; of *Theobaldinella* Blanchard, *Culex annulatus* Schrank; of *Pseudotheobaldia* Theobald, *Pseudotheobaldia niveitæniata* Theobald.

GENERIC DIAGNOSIS OF ADULT:

Proboscis slender; palpi short in the female, long in the male, as long as or longer than the proboscis, the terminal portion usually thickened, club-shaped in some species, never acuminate. Prothoracic lobes well separated. Clypeus and postnotum nude. Antennæ filiform in the female, the joints subequal, with basal whorls of sparse, short, hairs; the last two joints long in the male, the others short, thickened at the insertions of the hair-whorls; the hairs usually long, dense, plumose. Abdomen subcylindrical in the female, blunt at the apex; elongate and depressed in the male, usually with long lateral ciliation. Wings rather broad, the cross-veins either in line or approximately so; narrower in the male, the cross-veins often less distinctly in line. Legs rather long, the claws simple in the female, the hind tibial scraper with a row of about eight spines.

GENERIC DIAGNOSIS OF LARVA:

Head rather small, widest through the eyes; antennæ small, the hair tuft at the middle. Air-tube rather short, with basal pecten followed by a row of long fine hairs; a single pair of tufts situated very near the base. A lateral comb on the side of the eighth segment, consisting of a patch of minute scales. Anal segment encircled by the chitinous plate, with a ventral brush preceded by small tufts along the ventral line.

The genus *Culiseta* extends through the temperate portions of North America, Europe, Asia, and Africa. Most of the species extend well toward the north, some being confined to the subboreal regions. A few extend into the warmer climates, but principally in the elevated and more arid regions. One species is known only from Mexico, but not from the tropical portions.

The genus *Culiseta* is more generalized than *Culex* or *Aëdes*, as it partakes of the characters of both the aëdid and culicid stems. The species have been generally regarded as allied to *Culex*, Dr. Felt even tracing analogies between the genitalia. The larvæ, however, show a greater affinity to *Aëdes*, and this is supported by the structure of the posterior tibial scrapers of the imago, which are typically aëdid. The eggs are laid in boat-shaped masses and the adults hibernate, which are *Culex* characteristics. The tarsal claws of the female are simple, as in *Culex*, those of the male have two teeth on one claw, as in some species of *Aëdes*. The palpi of the female retain the small terminal joint, as in the aëdid stem; it is generally lost in the culices. The genus is usually recognizable by the venation, which is constant in most of the species, but in one (*inornatus* Williston) there is some variation, especially in the males, whereby the ordinary structure of the cross-veins appears, and individuals are liable to

Digitized by Google

be confounded with *Culex* or *Aëdes*. The large size is generally a help, as few of the other non-predaceous forms attain any such size as the species of *Culiseta*. The first separation of these species from *Culex* is due to Neveu-Lemaire, who separated them under the name *Theobaldia*, on the characters of the presence of the small terminal joint of the female palpi, but mixed with them some aëdid forms which have also this joint. In fact, Neveu-Lemaire's classification separates only *Culiseta* and *Aëdes* as against *Culex*. The application of the name *Theobaldia* to this group is due to the specification of the species *annulatus* Meigen as the type by Neveu-Lemaire. The name *Theobaldia* is too near the previous *Theobaldius* Nevill to be accepted and we therefore adopt Felt's term, *Culiseta*, which antedates Blanchard's substitute for *Theobaldia*, *Theobaldinella* Blanchard. *Culiseta*, as proposed by Dr. Felt, covers only the species with unspotted wings; we have added the others. Coquillett has attempted to separate *Culiseta* into two genera, but to do so was obliged to use characters of coloration and wing spotting, which are not admissible in generic definition. We have had no opportunity to examine specimens of *Pseudotheobaldia niveitæniata*, from India, but do not hesitate in referring it here from Theobald's description and figures (Mon. Culic., iv, 271–274, 1907). We think *Culex pettigrewii* Theobald (Records Ind. Mus., iv, 15–17, 1910; Mon. Culic., v, 351–353, 1910), from India, also will be found to belong here. The genus is a uniform and compact one, containing but few species. Five species are recognized in Europe, all with spotted wings. We think that there will be found to be one or more representatives with unspotted wings, when the species now classed under *Culex* have been more competently studied.

Of the six American *Culiseta* the larvæ of three are known to us. They are extremely similar in structure and appearance, so much so that it is difficult to distinguish one species from another. The characters which we have given in the table to separate the species are not very definite, nor, we fear, very certain. As a genus, however, the larvæ are distinguishable at a glance, for no other mosquito has the peculiar structures of the air-tube shown in these forms, with its single tuft situated near the base of the tube, the pecten followed by a row of long hairs. So far as they are known, the habits of the species are similar, differing only in the relative susceptibility to domestication. We are familiar with three species, and a fourth (*maccrackenæ* Dyar & Knab) has been observed by Miss Isabel McCracken in California. The larvæ all inhabit permanent water, in the wild state frequenting secluded pools in marshes, most frequently holes left by over-turned trees or pools in stream-beds; in the domesticated state, any water receptacle, usually a water barrel. As larvæ, the development is not very rapid, as they have no need to hurry through their stages on account of danger of evaporation of their water supply. The eggs are laid in boat-shaped masses, floating on the water. The species all pass the winter by hibernating as adults. Several of the European species as larvæ occur in artificial receptacles, but only one of the American species does so in any degree (*incidens* Thomson): the rest have not been observed to breed in any artificial receptacle unless well-holes, or portions of a lake cut off by clay banks can be regarded as such. We have found *inornatus* larvæ in such situations. The larvæ subsist upon the small particles in suspension in the water. They can not be classed as scavengers, for they inhabit clear, usually cold water, and are generally killed if the water becomes at all foul. On this account they are frequently difficult to rear in captivity. The adults are not particularly troublesome to man, being deliberate in their attacks and easily alarmed. Our species have no tendency to enter houses. The species may attract notice from their large size and the fact that they are the first mosquitoes to be seen in spring in the woods, having

Digitized by Google

emerged from hibernation before the leaves are out. They are then hungry and will attack persons in the daytime, though without any especial ferocity.

The European representatives of *Culiseta* appear, from the published accounts, to have essentially the same habits as ours, but some are more distinctly associated with man. *C. annulatus* Schrank is said to stay commonly in houses, stables, etc., and to hibernate in cellars, stables or caves. Theobald states that the male hibernates as well as the female (Mon. Culic., i, 335, 1901), but this observation has not been confirmed by others. Ficalbi thinks that this species and *C. spathipalpis* Rondani do not suck blood but live on the juices of plants. Theobald, however, quotes observations by W. Hatchett Jackson that *annulatus* bites very severely (Mon. Culic., iv, 277-278, 1907), and Edwards says "a particularly bad biter" (Entom. 261, 1912). Jackson also states that he observed females sucking the juices of plants. No doubt the adults occasionally bite, as do our species. Dr. Grabham observed *spathipalpis* at Madeira; it was not found in houses and did not bite (Theobald: Mon. Culic., iii, 155, 1903). No mating swarms have been observed in this genus. Grassi observed the copulation of *spathipalpis* (Studi di uno zoologo sulla malaria, 2 ed., 122, 1901), evidently just as with our *C. inornatus;* he found two pairs resting quietly on a window sash.

Tables of the Species.

Adults, structure and coloration.

1. Wing-scales narrow, hair-like; no scales on the cross-veins..... 2
   Wing-scales broader; scales present on the cross-veins..... 3
2. Tarsal joints narrowly white-ringed at base; wing-scales black, forming distinct spots at the vein forkings..... *incidens* Thomson (p. 478)
   Tarsal joints not white ringed; wing-scaled brown, forming indistinct spots at the vein forkings..... *impatiens* Walker (p. 483)
3. Tarsi not white-ringed; wings unspotted..... *inornatus* Williston (p. 488)
   Tarsi white-ringed at base; wings spotted..... 4
4. Middle and hind femora with a white ring..... 5
   Femora without white rings..... *alaskaensis* Ludlow (p. 498)
5. White rings on hind tarsi covering the basal halves of distal joints *maccrackenæ* Dyar & Knab (p. 494)
   White rings on hind tarsi covering the basal fourths of distal joints *dugesi* Dyar & Knab (p. 496)

Adults, male genitalia.

1. Penultimate segment with a ventral row of spines..... 2
   Penultimate segment without a row of spines below..... 3
2. Row of spines long; unci long and conical..... *impatiens* Walker (p. 486)
   Row of spines short; unci broadly truncate..... *incidens* Thomson (p. 480)
3. Unci slender, with small furcate crests..... *inornatus* Williston (p. 491)
   Unci uncrested 4
4. Unci approximate at tip, with a small hook..... 5
   Unci separated at tip, with a large hooked point... *alaskaensis* Ludlow (p. 500)
5. Penultimate segment of abdomen with two short stout spines *dugesi* Dyar & Knab (p. 497)
   Penultimate segment of abdomen without such spines *maccrackenæ* Dyar & Knab (p. 495)

Larvæ.

1. Lower head tuft with three long hairs, upper multiple..... 2
   Both head tufts multiple, alike..... *impatiens* Walker (p. 486)
2. Basal pecten-teeth of the air tube furcate..... *incidens* Thomson (p. 480)
   Basal pecten teeth of the air tube with many branches *inornatus* Williston (p. 491)

The larvæ of the following are unknown: *alaskaensis* Ludlow; *maccrackenæ* Dyar & Knab; *dugesi* Dyar & Knab.

Digitized by Google

CULISETA INCIDENS (Thomson) Felt.

Culex incidens Thomson, Kongl. Sven. Freg. Eugenies Resa, vi, Dipt., 443, 1868.
Culex incidens Giles, Gnats or Mosq., 329, 1900.
Culex nigripes Theobald (in part, not Zetterstedt), Mon. Culic., ii, 93, 1901.
Culex nigripes Giles (in part, not Zetterstedt), Gnats or Mosq., 2 ed., 444, 1902.
Culex particeps Adams, Kans. Univ. Sci. Bull., ser. 2, ii, 26, 1903.
Theobaldia incidens Theobald, Mon. Culic., iii, 151, 1903.
Theobaldia incidens Theobald, Can. Ent., xxxv, 311, 1903.
Grabhamia vittata Theobald (in part), Can. Ent., xxxv, 313, 315, 1903.
Culex incidens Dyar, Proc. Ent. Soc. Wash., vi, 38, 1904.
Culiseta incidens Felt, Bull. 79, N. Y. State Mus., 391c, 1904.
Theobaldia incidens Theobald, Gen. Ins., 26me Fasc., 23, 1905.
Theobaldinella incidens Blanchard, Les Moust., 393, 1905.
Theobaldia incidens Aldrich, Cat. N. Am. Dipt., 126, 1905.
Theobaldia incidens Dyar, Journ. N. Y. Ent. Soc., xiii, 24, 55, 1905.
Theobaldia incidens Felt, Bull., 97, N. Y. State Mus., 480, 1905.
Theobaldia incidens Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 22, 1906.
Theobaldia incidens Dyar, U. S. Dept. Agr., Bur. Ent., Circular No. 72, 4, 1906.
Theobaldia incidens Quayle, Univ. Cal. Agr. Exp. Sta., Bull. 178, 45, 1906.
Culiseta incidens Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 203, 1906.
Theobaldia incidens Theobald, Mon. Culic., iv, 279, 1907.
Culex particeps Theobald, Mon. Culic., iv, 279, 1907.
Culiseta incidens Dyar, Proc. U. S. Nat. Mus., xxxii, 122, 1907.
Theobaldia incidens Theobald, Mon. Culic., v, 275, 1910.

ORIGINAL DESCRIPTION OF CULEX INCIDENS:

Fuscus, opacus, abdomine nigro segmentis albo-marginatis, pedibus nigricantibus, coxis femoribusque albidis, his apice lineaque superne nigra; alis nervis transversis ordinario et brachiali incidentibus, subhyalinis fascia pone medium pellucida. ♀. Long. 5 mill.

Patria: California.

Statura omnino praecedentis [*Culex camptorhynchus* Thomson, ex Sydney], proboscide recta, abdomine albo-annulato, colore pedum et nervo transverso ordinario cum transverso brachiali in linea eadem verticali sito mox distinctus; fuscus opacus. Caput ovato-orbiculare, thorace angustius, pilis suberectis parce vestitum fuscum, oculis magnis subrenatis, fronte fere conniventibus, vertice convexo, brunneo; palpis fuscis, proboscide abdominis longitudine, recta, tenui, filiformi fusca. Antennae fuscae, scutelli apicem haud attingentes, articulis pilis erectis paucis verticillatis, 1:mo magno, subgloboso, 2:o 3:o longiore. Thorax oblongus, compressus latitudine sua duplo altior, dorso convexo; pronotum superne haud discretum; mesonotum apice producto, lineis dorsalibus nullis, fuscum pilis subsquamosis fulvescentibus submarmoratum, pleuris densius albido-squamosis; scutellum breve, transversum, linea basali distincta transversim impressa, apice pilis porrectis pluribus ornatum; postscutellum subdeclive fusco-brunneum, subglabrum, opacum, basi carinula abbreviata. Alae abdominis longitudine, hyalinæ, lobo distincto, alula longe ciliata, margine inferiore nervisque pilis adpressis, caducis brunneis instructis, cubitali et brachiali ante furcas subglabris quo fascia transversa pone medium formata; medii astino in tertia alae parte costam attingente, postcosta in apice excurrente, cubitali paullo pone medium egrediente, ante nervum transversum ordinarium et furca dense squamuloso, furca brachiali quam cubitali paullo breviore infra apicem alae marginem petente, nervo transverso ordinario et brachiali in eodem puncto incidentibus; humerali in medio alae furcato, furca marginem inferiorem attingente, nervis spuriis utrinque circumsepto; anali in medio alæ marginem inferiorem petente, axillári obsoletissimo.

Halteres obscure-testaceae. Abdomen thorace fere duplo longius, paullo angustius, subdepressum, alte supra coxas posticas insertum, basi utrinque densius et longius albido-pilosulum, segmentis 2–6 longitudine aequalibus, parce pilosis, subtransversis, nigris opacis, margine postico pilis adpressis subquamosis albidis vestitis. Pedes elongati, gracillimi, coxis albidis, apice contiguis, longitudine inter se aequalibus; femora et tibiae pilis erectis parce ornata, longitudine aequalia, abdomine haud breviora, subfiliformia, haud clavata, fusco-nigra; illa apice et margine inferiore albida; tarsis elongatis, articulis 1:mo tibia vix breviore, 2–5 sensim longitudine decrescentibus, 5:o 4:o fere duplo breviore, unguiculis parvis, pulvillis vix ullis.

Digitized by Google

ORIGINAL DESCRIPTION OF CULEX PARTICEPS:

Male: Head brown, covered with yellowish scales, among which are some pure white ones, few hairs along eyes black; proboscis dark brown, bearing a few yellowish scales; palpi brown, base of each joint white; antennae brown, lighter at base; thorax brown, bearing yellow and white scales, the latter most prominent on posterior part, pile black; halteres pale with brown knobs; abdomen brown, scales at base of segments white, on remaining part of segments the scales are brown, a few scattering ones yellow, venter almost wholly covered with white scales; fore coxae brown, others rather pale; femora black, with the posterior side on basal half, and a ring near apex white-scaled; tibiæ black, with a few white scales; tarsi black, with bases white; front and middle tarsal claws toothed, hind ones small and simple; veins of wings light brown, bearing narrow brown scales, those on the anterior part of wing intermixed with white ones; a spot at the origin of the second vein, the small cross-vein, and a spot beginning at the base of first submarginal and crossing the second submarginal and first posterior cells, clouded with brown; the cross-veins at end of first and second basal cells approximated; petiole of the first submarginal cell one-half the length of the cell.

Female: Agrees with male, except has more long black scales on head, petiole of first submarginal cell one-third the length of that cell; all tarsal claws simple. Length, 8 mm.

One male and six females; Arizona. Prof. F. H. Snow.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULISETA INCIDENS:

Female.—Proboscis rather long, slender, uniform, flattened dorso-ventrally; labellæ long, tapered to tip; vestiture black, with pale scales intermixed, particularly towards base beneath. Palpi about one-sixth the length of proboscis, vestiture black, with yellowish scales at bases of segments. Antennæ filiform, the joints slender, rather short, third joint about three times as long as wide, succeeding joints successively longer and slenderer, with fine fuscous pubescence; tori globose, with an apical excavation, fuscous, a group of whitish scales on inner side; hairs of whorls black, short, sparse. Clypeus flattened, broadly rounded, pruinose, black, without scales or hairs. Eyes black. Occiput clothed with narrow, curved scales on vertex, dark brown before, pale yellowish behind, those on border of eyes forming a whitish margin, many upright forked creamy yellow scales dorsally, cheeks with broad, flat, white scales.

Prothoracic lobes small, widely separated, pale scaled, with coarse, black, curved setæ intermixed. Mesonotum deep brown, sparsely clothed with minute, hair-like, very deep brown scales and large, narrow, curved, shining yellowish scales intermixed, which have a tendency to group in longitudinal series, forming a double broad stripe before and two narrow interrupted stripes subdorsally on posterior two-thirds, a pale marginal zone on anterior half, which is curved inwardly to joint subdorsal stripes in front; hind margin and bare space before scutellum surrounded by yellowish scales. Scutellum whitish scaled, with black setæ in three groups. Postnotum nude, piceous. Pleuræ dusky brown, coxæ luteous, with patches of pale scales and rows of pale bristles.

Abdomen subcylindrical, depressed, truncate at tip; black scaled above, with white basal bands occupying basal third or fourth of segments, with pale setæ on hind margins and a few along lateral margin; venter entirely yellowish-white scaled.

Wings moderate, hyaline, with round brown stains faintly shown at base of first marginal cell and bases of the two fork-cells; veins black scaled, except the cross-veins, which are naked; scales of two forms, long, narrow, appressed spatulate scales subtruncate at tip and long narrow outstanding scales, absent between cross-veins and bases of the two fork-cells, much heavier on basal halves of forks of second and fourth veins, the basal portion of second vein to junction with third vein, basal part of upper branch of fifth vein and outer two-thirds of sixth vein forming patches which appear as black spots; basal cross-vein, anterior cross-vein and stem of third vein nearly in line; first marginal cell

Digitized by Google

longer than second posterior cell and nearly twice as long as its stem. Halteres brownish, the knobs darker.

Legs long, slender; fore and mid femora with a black stripe on upper surface, which gradually broadens and at tip encircles the joint, at anterior fifth a yellowish-white spot on inner side, outer side entirely yellowish white except at tip; hind femora yellowish white, a dark brown stripe on upper surface, which is expanded at tip and there encircles the joint; knees yellowish white; all tibiæ entirely dark above, apex broadly yellow white, lower surface yellow-white scaled; tarsi black, all three pairs with the first and second joints narrowly yellow-white at bases, the third, fourth, and fifth joints with faintly indicated pale basal rings. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 to 6 mm.; wing 5 to 6.5 mm.

Male.—Proboscis nearly straight, slightly thickened on distal half, labellæ more elongate and obtuse; vestiture pale on basal half below. Palpi long, slightly exceeding the proboscis, slender basally, last joint club-shaped, apex of long joint and last two joints clothed with long black hairs; vestiture black, long joint whitish at base and broadly white ringed beyond middle; last two joints white ringed at bases. Antennæ densely plumose; last two joints long and slender, rugose, pilose, black, the others short, slender, whitish, with black rings at insertions of hair-whorls. Occiput with erect, forked scales of vertex pale yellowish, those on the sides black. Abdomen long, slender, depressed, broadened posteriorly, with abundant, fine pale lateral ciliation; venter with apical dark segmental bands, last segment entirely dark scaled above. Wings much narrower than in the female, the stems of the fork-cells longer; vestiture less abundant. Claw formula, 2.1–2.1–0.0.

Length: Body about 5 to 6.5 mm.; wing 4.5 to 5.5 mm.

Genitalia (plate 35, fig. 232): Side-piece stout, somewhat elongate, rounded at apex; basal lobe slight, bearing two very stout approximate setæ; apical lobe represented by a stout setæ and a group of small ones. Clasp-filament rather slender, tapering gradually from slightly expanded base and bearing a small apical articulated spine. Harpe elongate, slender, with apex slightly expanded, divided into two major apical teeth and one or two smaller subapical ones. A basal sensory lobe, oval or subglobular, crowned with numerous stout setæ. Harpago conical, thin, membranous. Unci approximate, convolute, ventral margin broadly rounded and tapering to a truncate posterior edge. A short row of about eight stout spines on ventral line of penultimate segment.

Larva, Stage IV.—Head rounded, narrowed before eyes, a notch at insertion of antennæ, the front margin arcuate. Antennæ small, subcylindrical, sparsely spined, swollen toward base; a large hair-tuft a little before middle; four subequal terminal setæ, one of which arises before tip; a small digit. Eyes large, pointed. Both pairs of dorsal head-tufts and ante-antennal tuft multiple. Mental plate elongate-triangular, with a central tooth and twelve on each side, the last one small and widely remote, followed by a still smaller basal notch. Mandible quadrangular, elongate, the part beyond the collar especially prominent; two stout and two feathered filaments before the collar, preceded by two shorter feathered filaments; a row of cilia from a collar; twelve tufts of filaments on outer margin, those next collar long and not more than double, outer ones progressively shorter and tufted; dentition of four teeth, sessile, the first longest; four slender teeth before; a row of small serrations at base, a serrate filament and six feathered hairs within; process below widely furcate, with hairs on both forks; basal angle slender and incurved; a group of hairs within; a row of long hairs at base. Maxilla irregularly hemispherical, divided by a suture which runs inwardly, the inner part being nearly parallel to base; inner half hairy toward margin, with a group of hairs near angle of suture; a rather short

Digitized by Google

hair-tuft at tip; outer half sparsely haired without; two stout separate filaments situated near suture subapically. Palpus moderate, with small apical digits. Thorax rounded, wider than long, robust; hairs abundant, the single hairs rather long, prothoracic tufts multiple and nearly as long as head. Abdomen stout, the anterior segments short; hairs rather short, lateral hairs multiple to fifth segment, double on sixth, single on seventh, confused by subdorsal and subventral tufts which are rather long on third to sixth segments. Tracheal tubes moderate, not band-shaped, flexuous posteriorly. Air-tube stout, tapered outwardly, two and a half times as long as wide; pecten of small teeth at base becoming long hairs beyond basal fourth and running to apical third; a large tuft close to base, almost at base of pecten. Lateral comb of eighth segment of many spines in a triangular patch; single spine with a round blunt basal production and two similar ones at base of shaft, apical part long, even and rounded, fringed with long spinules. Anal segment about as long as broad, ringed by the plate; dorsal tuft a group of three hairs and a brush on each side; a two-haired lateral tuft; ventral brush well developed, with small tufts preceding nearly to base. Anal gills small, shorter than the segment, tips abruptly pointed.

The eggs are laid in large boat-shaped masses or "rafts." They float on the water, usually at the margin, where they are drawn by capillary action. The eggs hatch in a few days after being laid, the time depending upon the temperature. The young larvæ scatter in the water and begin feeding on the minute particles in suspension. The growth is not very rapid, occupying about a month, but varying with the temperature and amount of food present. The pupal state lasts but a few days, when the adults are again on the wing. Several broods succeed each other, so that adults occur throughout the season; the adult females finally go into hibernation to reappear early in spring. The larvæ are inhabitants of permanent water, cold spring holes or holes left by overturned trees being the natural breeding-places. They take readily to artificial receptacles, such as water barrels or small ponds in lawns and artificial fountains, when unsupplied with running water. A small current of water is not detrimental to them, specimens occurring in the edges of swiftly running ditches and similar locations. Near Los Angeles, California, Dr. Dyar observed larvæ in a wooden box interposed in a supply pipe of running water; at San Diego, California, in a little stream caused by a leak in a city water main. The larvæ do not inhabit foul water, but prefer that which is clear and cold and preferably well shaded. Water which has collected in cellars with concrete floors is especially favorable to them. The species has become semi-domesticated and is the common larva to be found in water barrels in the region west of the Rocky Mountains. Railroad trestles and stations are generally supplied with rows of such barrels which are kept filled with water for use in case of fire; these are generally to be found well stocked with *incidens* larvæ. Early in the season no larvæ will be found, as the adults are only just from hibernation, but later the larvæ become increasingly more abundant. The adults are not troublesome. They will occasionally bite, but approach with caution and are easily frightened. On one occasion one of us sat in the woods near Ashford, Oregon, and was approached by an individual of this species. It alighted, but immediately flew away again, on a motion to capture it being made, and lit on a bush about 10 feet off near the ground. Here it remained for fully ten minutes, when it flew up and again cautiously approached. It was captured only at the third approach, without having bitten. At Mount Shasta, California, a specimen was observed to bite a horse. We have not observed the adults in houses. They frequent woods and the vicinity of their breeding-places. The mating habits have not come under observation.

Digitized by Google

Miss McCracken has observed the oviposition and we quote the following from her manuscript notes:

"On June 7 at 6.45 a. m., in a tub that had been placed by a hedge in the Mariposa yards, on the University campus, I discovered a female *C. incidens* in the act of ovipositing. About half of the batch had been deposited. The female rested lightly on the surface of the water, with fore and middle pairs of legs well spread out, wings in resting position; the hind legs approached each other at the distal ends of the tibiæ, the tarsal joints spread out from this point in a Λ-shaped manner, within which enclosure the egg-mass was shaped. The eggs came forth one by one, the narrower end first. Each egg was ejected upward, sliding into an erect position by the side of its neighbors, the abdomen then moved slightly to one side, so that the next egg deposited took its place by the side of the previous one. The first egg deposited stood alone, forming the end of the boat-shaped mass. The second two stood side by side, forming an angle with this one; a third group of three increased the length of the base of the triangle. The rest of the mass became irregularly four, five, or six eggs in a row, the number beginning to decrease at the 22d row. The last row was rounded off with three eggs. When completed the mass contained two hundred and seventy-five eggs. One egg followed the other without any perceptible lapse of time. Within two minutes ovipositing was completed and the adult flew. The mass of eggs was at first snow white and continued so for three-quarters of an hour. At 7 a. m. it turned a light greenish-gray and gradually but quickly changed to brown, assuming the permanent dark brown at 8 a. m., one and three-quarters hours after being deposited. Upon several later occasions, I have found both *incidens* and *tarsalis* depositing as early as 5 a. m. and the masses of white eggs floating on the water at this time showed that oviposition had taken place some time before.

"The eggs procured on the morning of the 7th were placed in a shallow glass dish with water from a neighboring pool. They were hatched on the morning of the 9th. The average noonday temperature of the water in the laboratory at this time was 18½° C. The first larval skin was cast on the 12th at noon, second moult on the 17th between 9 a. m. and noon. On the morning of the 23d several pupæ appeared in the jar and other pupæ irregularly for several days following. On the morning of the 25th the first adults appeared. Pupation and emergence of adults continued until the morning of the 29th. Under laboratory conditions, therefore, the egg stage had occupied two days, first larval stage two days, second larval stage five days, third [and fourth] larval stage seven days, pupal stage two days. This gives the minimum time in each stage. All individuals hatched at the same time, all cast the first larval skin within thirty or forty minutes of each other, all cast the second larval skin within an hour or two of each other. The cast of the third larval skin and emergence of adult took place irregularly from one to five days apart. This irregularity seems to be not entirely a laboratory condition, *Aëdes quaylei* being the only species the individuals of which under natural conditions have appeared to have developed stage by stage simultaneously."

Western coast of North America and the Rocky Mountains from Mexico to Canada. We have seen no specimens from Mexico, though it must occur on the northern boundary at least. It extends well into Canada in British Columbia, though we have no far northern records.

Las Vegas Hot Springs, New Mexico, August 12 (H. S. Barber); Pecos, New Mexico, June 26 (T. D. A. Cockerell); Santa Fé, New Mexico, July (T. D. A. Cockerell); Beulah, New Mexico, July 15 (T. D. A. Cockerell); Flagstaff, Arizona, July 6, August 4 (H. S. Barber); Grand Cañon, Arizona, May (H. G. Dyar); Andamana, Arizona, May 7, 1903 (H. S. Barber); Williams, Arizona,

Digitized by Google

July 15 (H. S. Barber); San Diego, California, February 3, 1906 (J. M. French; Dyar & Caudell); Los Angeles, California, June 10 (H. G. Dyar); Pasadena, California (H. G. Dyar); Stanford University, California, October 11, 1900 (Isabel McCracken); Dunsmuir, California (A. N. Caudell); Eureka, California (A. N. Caudell); San Francisco, California (A. N. Caudell); Klamath Falls, Oregon (Dyar & Caudell); Ormsby Co., Nevada, July 6 (C. F. Baker); Portland, Oregon (R. P. Currie; H. G. Dyar); Kent, Washington, June 30, 1905 (H. E. Burke); Vancouver, British Columbia, August 6 (Dyar & Caudell); Wellington, British Columbia (H. G. Dyar); Kaslo, British Columbia (Dyar, Caudell and Currie); Bennett, British Columbia, June 1, 1903 (N. Hollister); Fieldbrook, California, May 30, 1903 (H. S. Barber); Bair's Ranch, Redmond Creek, Humbolt Co., California, June 11 (H. S. Barber); Lewiston, Idaho, June 16, 1902 (J. M. Aldrich); Stockton, California (H. J. Quayle); Victoria, British Columbia, August 12 (Dyar and Caudell); San Jose, California, May 18, 1906 (I. McCracken); Yosemite National Park, June 12, 1904 (A. D. Hopkins); Big Fork, Montana (Edith Ricker); Oakland, California (I. McCracken); Arden, California (I. McCracken); Claxton, British Columbia, July, 1901 (J. H. Keen); Metlakahtla, British Columbia, June 3, 1901, May 15, 1902 (J. H. Keen); Moscow, Idaho, October 28, 1901 (J. M. Aldrich); Kendrick, Idaho, May 25, 1902 (J. M. Aldrich); Banff, Alberta (H. G. Dyar); Plateau Cañon, Grand Junction, Colorado, August 23, 1906 (E. P. Taylor). Also reported from California (Thomson); Pecos, New Mexico, Moscow, Idaho, Corvallis, Oregon (Theobald); Seattle and Pullman, Washington (Aldrich).

This species was fully described by Thomson, but was nevertheless mixed up with some of the black-legged species of *Aëdes* by later authors, to be finally separated out again. It is a very distinct form, superficially resembling *Anopheles quadrimaculatus* Say, so much so as to sometimes cause confusion in a superficial examination, especially in the case of males. There is, of course, no real relationship between these species. Theobald has described the larva of this species as that of his *Grabhamia vittata* (Can. Ent., xxxv, 315, 1903).

CULISETA IMPATIENS (Walker).

Culex impatiens **Walker, List Dipt. Brit. Mus., i, 5, 1848.**
Culex pinguis **Walker, Lord's Naturalist in Vanc. Id. & Brit. Col., ii, 337, 1866.**
Culex pinguis **Walker, Hardwicke's Science-Gossip for 1867, 81, 1867.**
Culex impatiens Giles, Gnats or Mosq., 293, 1900.
Culex pinguis Giles, Gnats or Mosq., 342, 1900.
Culex consobrinus **Coquillett (in part, not Desvoidy), Proc. Wash. Acad. Sci., ii, 395, 1900.**
Culex consobrinus **Coquillett (in part, not Desvoidy), U. S. Dept. Agr., Div. Ent., Circ. No. 40, 7, 1900.**
Culex consobrinus **Theobald (in part, not Desvoidy), Mon. Culic., ii, 78, 1901.**
Culex consobrinus **Giles (in part, not Desvoidy), Gnats or Mosq., 2 ed., 445, 1902.**
Culex absobrinus **Felt, Bull. 79, N. Y. State Mus., 278, 280, 318, 1904.**
Culiseta absobrinus **Felt, Bull. 79, N. Y. State Mus., 391c, 1904.**
Culex consobrinus **Dyar (not Desvoidy), Proc. Ent. Soc. Wash., vi, 41, 1904.**
Culex inornatus **Aldrich (in part, not Williston), Cat. N. A. Dipt., 129, 1905.**
Culiseta absobrinus **Felt, Bull. 97, N. Y. State Mus., 448, 481, 1905.**
Culex absobrinus **Dyar, Journ. N. Y. Ent. Soc., xiii, 24, 1905.**
Theobaldia absobrinus **Dyar, Journ. N. Y. Ent. Soc., xiii, 107, 1905.**
Culiseta absobrinus **Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 204, 1906.**
Culiseta absobrinus **Coquillett, Science, n. s., xxiii, 313, 1906.**
Culiseta absobrinus **Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 22, 1906.**
Culiseta absobrinus **Dyar, U. S. Dept. Agr., Bur. Ent., Circular No. 72, 4, 1906.**
Culiseta absobrina **Theobald (in part), Mon. Culicid., iv, 383, 1907.**
Culiseta absobrina **Theobald, Mon. Culic., v, 322, 1910.**
Culex consobrinus **Theobald (not Desvoidy), Mon. Culic., v, 358, 1910.**
Culex pinguis **Theobald, Mon. Culic., v, 397, 1910.**

Digitized by Google

ORIGINAL DESCRIPTION OF CULEX IMPATIENS:

mas. *Nigro-fuscus, fusco hirtus, thorace trivittato, vitta intermedia apice furcata, abdominis segmentis cano cinctis, pedibus fuscis, tarsis nigris, alis limpidis.*

Body dark brown, clothed with pale brown hairs: feelers and mouth black: chest with three pale brown stripes, the middle one slender and forked towards the tip; abdomen with a hoary band at the fore border of each segment; its sides clothed with long hairs: thighs brown, with black tips; shanks dark brown; feet black: wings colourless; veins brown; poisers very pale brown.

fem. *Rufus, flavo hirtus, thorace fusco trivittato, abdomine fusco, segmentis flavo cinctis, pedibus pallidè fuscis, femoribus tibiisque apice flavis, tarsis nigro-fuscis, alis limpidis.*

Body red, clothed with yellow hairs: head thickly covered: chest with three brown stripes: abdomen brown, with a yellow band at the fore border of each segment: legs pale brown: tips of the thighs and of the shanks yellow; feet dark brown: wings colourless; veins brown; poisers yellow, with brown tips. Length of the body 3 lines; of the wings 6 lines.

a. St Martin's Falls, Albany River, Hudson's Bay. Presented by G. Barnston, Esq.

ORIGINAL DESCRIPTION OF CULEX PINGUIS:

Foem.—Cervinus, robustus; rostro apicem versus nigro; abdominis pube subaurata; pedibus robustis pallidioribus; alis cinereis, venis fulvis subpilosis.

Female.—Fawn-colour, stout. Proboscis much longer than the head, and the thorax black towards the tip. Abdomen with slightly gilded down. Legs stout, paler than the body; tarsi darker. Wings cinereous; veins tawny, slightly pilose; radial and subapical veins, with long forks. Length of the body, 3⅓ lines; of the wings, 7 lines. [Fraser River, British Columbia.]

ORIGINAL DESCRIPTION OF CULEX ABSOBRINUS:

Larvæ, first referred to Culex consobrinus Desv., were taken in a cold mountain pool at Elizabethtown, N. Y., July 8, where they were found in small numbers. A few adults were captured in the same locality the latter part of August.

Female. Proboscis about as long as the abdomen, dark brown; palpi light brown, rather sparsely clothed with yellowish white scales. Antennæ black, sparsely clothed with short, brown hairs and with several long, black ones at bases of joints. Eyes coarsely granulate, greenish. Occiput sparsely clothed by and margined anteriorly with white scales, and with a thick tuft of the same at the juncture of the eyes; numerous erect, scattering, black scales occur among the yellowish white ones. Thorax brown, clothed with a fine, appressed pile; a median line of dark brown or black scales, golden yellow anteriorly and terminating at the posterior third in an irregular, rather loose group of golden yellow hairs; a submedian line of golden yellow hairs bordered internally with long, black ones and extending anteriorly into a somewhat irregular patch. Anterior margin of thorax with golden and yellowish white scales, the lateral margin bordered by long, blackish hairs, and internally with a few yellowish white scales. Scutellum brownish, clothed apically with a row of long, brownish hairs and with a pair of submedian patches of whitish scales anteriorly; postscutellum brownish, naked. Pleura clothed with irregular patches of whitish and yellowish white scales. Dorsal surface of abdominal segments dark brown, with well marked, creamy white basal bands; under surface suffused with fine, creamy white scales. Wing veins dark, thickly clothed with dark brown scales; posterior cross vein less than ½ its length from mid cross vein. Legs light brown, with darker brown scales forming indistinct bands, there being lighter rings at the apex of femora and tibiae. The markings are too faint to be construed as bands. Claws simple. Petiole of first submarginal cell about ½ the length of the same, and that of the second over ½. Fringes and scales clothing the veins mostly dark fuscous, thick, scales very long, narrow. Fringe composed of scales of several lengths as in the pipiens group. Halteres capitate, stem and base yellowish, tip black anteriorly.

Male. Palpi long, purplish brown, without conspicuous plumes; 4 segmented, the apical two joints being slightly larger than the longer basal ones, the second longer than the first. Proboscis the same color, length and general appearance of the palpus. Antennae rather sparsely ornamented with brownish plumes, brown, each segment annulate with white. Eyes rather coarsely granulate, greenish black. Occiput rather sparsely clothed with silvery yellow scales, which form a distinct line on posterior border of the eyes, a sparse median tuft at their juncture, and also have a somewhat linear arrangement each side of the median line; erect black forked scales rather sparse. Thorax with a median line of mixed black, golden yellow scales, obsolete posteriorly. Humeri sparsely clothed with an irregular patch of golden yellow scales, with a few black ones intermixed. There is a submedian line

Digitized by Google

of coarse hairs bordered outwardly by golden yellow scales, and traces of similar sublateral ones near the base of the wings. Posterior portion of prothorax smooth, bordered anteriorly by an irregular patch of golden yellow scales, with black hairs intermixed. Scutellum crowned with long, black hairs and with somewhat irregular, obsolete, submedian patches of golden yellow scales; postscutellum smooth, slaty gray. Pleura sparsely clothed with irregular patches of silvery yellow scales. Abdomen dark brown, with rather narrow, basal bands of silvery white scales; sparsely clothed, specially laterally, with slender, golden yellow hairs. Basal portion of clasp stout, thickly haired, yellowish brown; apical portion slender, uniformly curved, yellowish brown. Ventral surface brownish black, that of the second, third and fourth segments being sparsely clothed with silvery yellow scales, and each of the latter with a distinct basal band of the same color. Wings hyaline; anterior margin and first longitudinal vein rather thickly clothed with dark brown scales, others with lighter colored ones; fringe slaty gray. Petiole of first submarginal cell about equal in length to the cell, that of the second about one-fourth longer. Posterior cross vein less than its own length from mid cross vein. Halteres, basal portion pale yellowish white, apical portion capitate, dark brown. Coxæ slaty gray, golden yellow apically. Legs dark purplish brown, with apexes of femora and tibiæ clothed with golden yellow scales. Anterior and mid ungues uneven, one claw bidentate, one unidentate, posterior simple. Posterior legs enormously prolonged; tarsal segments extremely attenuate and fragile.

Described from a freshly bred specimen July 14, 1904.

Larva. Antenna rather stout, curved, with a thick, well developed tuft of plumose hairs at its basal third and a pair of long, slender spines at the apical fifth, in addition to one long spine and two rudimentary, tapering processes at the apex. Labial plate subtriangular, with about 29 rather fine teeth, basal portion with distinct, rather coarse reticulations. Thoracic and anterior abdominal segments clothed with numerous stout, black, plumose hairs, the other abdominal segments bearing slightly compound, weakly plumose hairs. In addition, there are smaller groups of compound hairs. The comb consists of a triangular patch of about 60 scales arranged in five irregular rows, each scale with a brown, basal, somewhat spatulate enlargement and terminated by an expanded, nearly colorless tip bearing a series of rather fine subequal, apical spines, smaller spines extend on each side to the extreme base. Air tube about four times as long as wide, slightly inflated and with two rows of pecten at the basal fifth, each consisting of about 14 closely set teeth bearing at their bases one or two conspicuous processes; pecten extended by a well marked row of about 16 simple bristles reaching to the apical fifth of the air tube. There is a posterior pair of compound, plumose hairs at the base of the air tube. Ventral tuft short and consisting of about 14 well developed, compound hairs attached to the barred area, with three anterior. Dorsal tuft composed of a single, stout, compound hair and a pair of very long, slender, simple hairs.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULISETA IMPATIENS:

Female.—Proboscis long and slender, uniform; labellæ elongate, gradually tapering; vestiture entirely black. Palpi slender, short, about one-fifth the length of proboscis; vestiture dark brown, some scales and the apex with a yellowish-silky luster in certain lights. Clypeus flattened, rounded, brown, faintly pruinose. Antennæ filiform, slender; tori globose, dull chestnut, with a patch of light scales within; hairs of whorls short, sparse, black. Eyes black. Occiput clothed sparsely with narrow, curved yellowish-white scales, margin of eyes very narrowly whitish, many erect, forked black scales dorsally; cheeks clothed with broad, white scales; stiff black bristles near eye-margins.

Prothoracic lobes small, lateral, with whitish scales and brown bristles. Mesonotum deep-brown, clothed rather sparsely with small, narrow, curved, bronzy brown scales, with larger pale-yellowish scales scattered and in patches; a narrow, median, longitudinal pale line; two very conspicuous sublateral, light spots medianly on disk; behind each of these a light line, running nearly to scutellum; on the margin are some irregular light stripes which send out offshoots anteriorly, one of them in the form of a narrow line joins the discal spot; anterior margin with three distinct yellowish-white spots; antescutellar bare space margined with pale scales. Scutellum clothed with yellowish-white scales and with three groups of coarse dark bristles. Postnotum brownish, with a

Digitized by Google

median dark line, nude. Pleuræ and coxæ brownish, with patches of yellow-white scales and rows of brown bristles.

Abdomen subcylindrical, depressed, truncate at tip, black scaled above, a yellowish-white band at base of each segment; first segment yellowish-white scaled and with many pale hairs; eighth segment entirely light scaled; the bands occupy one-third to one-fourth of segment and are slightly produced in the middle; the bands on the sixth and seventh segments are broadened on the sides; venter entirely pale scaled; abdominal hairs with yellowish luster.

Wings broad, hyaline, with diffused brownish spots at bases of second and third veins and on the cross-veins; second marginal cell more than twice the length of its stem, second posterior cell shorter than its stem, cross-veins nearly incident; veins entirely dark-brown scaled, the scales of two forms, the appressed ones elongate, subtruncate at tip, the outstanding ones linear, long, and curved; the scaling is denser on certain veins, sometimes due to the greater number of outstanding scales, sometimes to the greater development of appressed scales; at the base of the third vein the scales form a well marked, but slight black spot, base of second vein and bases of the forks of second and fourth veins also more heavily scaled. Halteres with brownish stems and darker knobs.

Legs long and slender; vestiture blackish, femora pale scaled beneath to near apices; a narrow pale line on under side of tibiæ; knees yellowish white scaled; tips of tibiæ yellowish white scaled, those of fore and middle pairs very broadly, of hind pair more narrowly so; tarsi entirely black. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 to 6.5 mm.; wing 5 to 7 mm.

Male.—Proboscis straight, slender. Palpi slender, about as long as the proboscis, end of long joint and penultimate one slightly thickened, the last joint forming a stout club, all with long black hairs; vestiture of brown scales. Antennæ sparsely plumose; last two joints long and slender, rugose, pilose, black, the others short, slender, whitish, with black rings at insertions of hair-whorls. Coloration similar to the female. Occiput with the erect forked scales on vertex pale yellow, those on the sides black. Wings narrow, the stems of the fork-cells longer than in the female, basal cross-vein farther removed from anterior one, vestiture less abundant. Abdomen elongate, depressed, somewhat expanded posteriorly, with dense pale brown lateral ciliation; venter with dark apical bands, narrowly interrupted along median line. Tarsal claw formula, 2.1–2.1–0.0.

Length: Body about 5 to 6 mm.; wing 5 to 6 mm.

Genitalia (plate 35, fig. 231): Side-piece very stout, rounded at apex; basal lobe expanded rounded, setaceous with a single central coarse seta on a pedicel; outer lobe undeveloped, its area more densely setaceous. Terminal filament enlarged at base, gradually tapering to apex, which bears a stout, short, articulated spine. Harpe elongate, slender with apex slightly expanded and divided into six subequal teeth on posterior margin. Harpago long, thick, cylindrical, with truncate open tip, appearing like a curved tube, about as long as harpe, smooth. Unci broad at base, narrowing posteriorly to oblique rounded extremities. Setaceous lobes slightly produced, separate, each bearing six to nine stout setæ. Posterior margin of preceding segment heavily chitinized, with a long median band of dense, stout, short spines, about 26 in number.

Larva, Stage IV.—Head rounded, narrowed before eyes, a notch at insertion of antennæ, the front margin arcuate. Antennæ small, subcylindrical, sparsely spined, a long tuft a little before the middle; two long and two shorter apical setæ and a long digit on a pedicel. Eyes large, pointed. Both pairs of dorsal head-tufts and ante-antennal tufts multiple. Mental plate elongate-triangular, with a central tooth and thirteen on each side, basal ones longer and more remote, last one small. Mandible quadrangular, elongate, part beyond collar

Digitized by Google

specially prominent; two stout and two slender filaments before collar; a row of cilia outwardly; twenty filaments on outer margin in a double row, the outer ones short, all bluntly tipped; dentition of five teeth on a process, the second one the longest, two rounded teeth before, three at base, a broad serrate filament within; process below short, rather widely furcate, with hairs outwardly; basal angle blunt, a group of hairs within; a row of long hairs at base. Maxilla hemispherical, divided by a suture which runs inwardly, the inner part being parallel to base; inner half hairy toward margin, with a group of small hairs near angle of suture; two hair-tufts at tip; outer half sparsely haired without, two stout separate filaments situated near suture subapically. Palpus small, with four curved apical digits. Thorax rounded, wider than long, robust; hairs abundant, single hairs rather long, prothoracic tufts multiple and nearly as long as head. Abdomen stout, the anterior segments short; hairs rather short, lateral hairs multiple to fifth segment, double on sixth, single on seventh, confused by subdorsal and subventral tufts, which are rather long on third to sixth segments. Tracheal tubes moderate, not band-shaped, flexuous posteriorly. Air-tube stout, tapered outwardly, two and a half times as long as wide; pecten of small teeth at base, becoming long hairs beyond basal fourth and running to apical third; single spine with three basal branches, except in the case of the outer hair-like spines; a large tuft close to base, almost at base of pecten. Lateral comb of eighth segment of many scales in a triangular patch; single scale with apical part long and widened a little outwardly, evenly fringed with long spinules. Anal segment about as long as broad, ringed by the plate; dorsal tuft a group of three hairs and brush on each side; a two-haired lateral tuft; ventral brush well developed, with small tufts preceding nearly to base. Anal gills small, shorter than the segment, their tips rounded.

The eggs are laid in large boat-shaped masses, floating on the water, and hatch within a few days after being laid. The growth of the larvæ is slow. The pupal state lasts but a few days. The adult females go into hibernation, to emerge early in spring and deposit their eggs. The larvæ are inhabitants of permanent water, cold spring-holes or holes left by overturned trees being natural breeding-places. They do not take to artificial breeding-places, such as water barrels, and seem confined to their original wild habitat. The species is consequently rare, except perhaps in the far North. The larvæ inhabit clear, cold water. A favorite locality, kindly shown to one of us by Dr. Felt, is a large pool at the foot of a cliff near the summit of Cobble Hill, at Elizabethtown, New York, which is fed by the melting of ice in some ice caves. This pool is very large early in spring and is then filled with larvæ of other species; the *impatiens* larvæ appear later from eggs laid by the hibernated females. The adults are not troublesome. Besides being rare, only approaching by individuals, they are deliberate in their attacks and easily alarmed. They are also slow to bite, though their large size may easily cause apprehension in a prospective victim. We have not observed the adults in houses. They frequent the woods near their breeding-places. The mating habits have not come under observation, and no mating swarms have been seen.

North America, throughout the northern part of the continent from ocean to ocean, in subboreal situations.

Weld, Maine, August, 1910 (H. G. Dyar); Monadnock, New Hamhshire, May 1, 1911 (A. H. Thayer); Cobble Hill, Elizabethtown, New York, April 25, August 8, 1905 (H. G. Dyar); Tupper Lake, New York (H. G. Dyar); Waterville, New Hampshire (A. D. Hopkins); White Mountains, New Hampshire (H. K. Morrison); Kaslo, British Columbia (H. G. Dyar); Sitka, Alaska, June 16, 1899 (Harriman Expedition, T. Kincaid, collector); Yakutat, Alaska,

Digitized by Google

June 21, 1899 (Harriman Expedition); Valley of the Mayo River, Yukon Territory, latitude 63° 45′, longitude 136°, 1904 (J. Keele). Also reported from St. Martin's Falls, Albany River, Hudson's Bay Territory (Walker).

Culiseta impatiens is nearly allied to *incidens* Thomson, in common with it lacking the scales on the cross-veins of the wings, and having the ventral row of short spines on the penultimate segment of the male. Dr. Felt has confused the homology of the male genitalia by failing to observe the harpagones in *incidens* and identifying the harpagones of *impatiens* with the harpes. The genitalia are different enough, but not so widely so as his descriptions would imply. The species was for a long time confounded with *inornatus* Williston, to which it is not so nearly allied as to *incidens*, but which it more nearly resembles superficially. Dr. Felt was the first to distinguish the two species, but we have not been able to conserve either of his names. The female of *impatiens* is distinguishable from *inornatus* by the absence of any pale scales on the wing veins; the male by the presence of the pale abdominal bands, which are absent in *inornatus*. Walker's types of *impatiens* and *pinguis* have not been examined by us, but we think no other species could have been under observation, considering the large size and the northern habitat of both. The names have been quoted under *inornatus*, owing to the confusion of these species. Theobald, in treating *Culiseta impatiens*, figures a wing of *C. inornatus* as the male of *impatiens* (Mon. Culic., iv, 385, fig. 157), as is evident from the presence of scales on the cross-veins; we are therefore obliged to give the reference under both species.

CULISETA INORNATUS (Williston) Dyar.

Culex inornatus Williston, U. S. Dept. Agriculture, Div. Ornith. & Mammol., No. Am. Fauna No. 7, 253, 1893.
Culex consobrinus Howard (not Desvoidy), U. S. Dept. Agr., Div. Ent., Bull. 4, n. s., 22, 1896.
Culex consobrinus Coquillett (not Desvoidy), U. S. Dept. Agr., Div. Ent., Circular 40, 5, 6, 1900.
Culex consobrinus Howard (not Desvoidy), U. S. Dept. Agr., Div. Ent., N. Ser. Bull. 25, 19, 20, 1900.
Culex inornatus Giles, Gnats or Mosq., 321, 1900.
Culex consobrinus Theobald (in part, not Desvoidy), Mon. Culic., ii, 78, 1901.
Culex consobrinus Giles (in part, not Desvoidy), Gnats or Mosq., 2 ed., 445, 1902.
Culex consobrinus Dupree & Morgan (not Desvoidy), Science, n. s., xvi, 1036, 1902.
Culex inornatus Aldrich, Can. Ent., xxxv, 209, 264, 1903.
Culex consobrinus Coquillett (not Desvoidy), Can. Ent., xxxv, 218, 1903.
Culiseta consobrinus Theobald (not Desvoidy), Can. Ent., xxxv, 312, 1903.
Culex consobrinus Dyar (not Desvoidy), Journ. N. Y. Ent. Soc., xi, 24, 1903.
Culex consobrinus Pazos, Bull. Soc. Ent. France, 134, 1904.
Culex magnipennis Felt, Bull. 79, N. Y. State Mus., 278, 280, 322, 1904.
Culiseta magnipennis Felt, Bull. 79, N. Y. State Mus., 391c, 1904.
Culex consobrinus Theobald (not Desvoidy), Gen. Ins., 26me Fasc., 27, 1905.
Culex consobrinus Blanchard (in part, not Desvoidy), Les Moust., 352, 1905.
Culex inornatus Aldrich (in part), Cat. N. Am. Dipt., 129, 1905.
Culiseta consobrinus Felt (not Desvoidy), Bull. 97, N. Y. State Mus., 448, 481, 1905.
Culex consobrinus Dyar (not Desvoidy), Journ. N. Y. Ent. Soc., xiii, 24, 26, 107, 1905.
Culiseta consobrinus Coquillett (not Desvoidy), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 22, 1906.
Culiseta consobrinus Dyar (not Desvoidy), U. S. Dept. Agr., Bur. Ent., Circular No. 72, 4, 1906.
Culiseta consobrina Quayle, Univ. Cal., Agr. Exp. Stat., Bull. 178, 52, 1906.
Culiseta consobrinus Dyar & Knab (not Desvoidy), Journ. N. Y. Ent. Soc., xiv, 204, 1906.
Culiseta inornatus Dyar, Proc. U. S. Nat. Mus., xxxii, 123, 1907.
Culiseta absobrina Theobald (in part, not Felt), Mon. Culic., iv, 385, fig. 157, 1907.
Culiseta inornata Knab, Smiths. Misc. Colls., quart. iss., 1, 547, 1908.
Culex consobrinus Pazos (not Desvoidy), San. y Ben., ii, 50, 561, 1909.
Culiseta inornatus Thibault, Proc. Ent. Soc. Wash., xii, 20, 1910.
Culex consobrinus Theobald (in part, not Desvoidy), Mon. Culic., v, 358, 1910.

Digitized by Google

ORIGINAL DESCRIPTION OF CULEX INORNATUS:

Female.—Palpi yellowish brown. Proboscis yellowish, black at the tip. Antennae black, the basal joints yellowish. Occiput black, clothed mostly with whitish pubescence. Thorax red, the dorsum reddish brown, thinly clothed with light yellow and white tomentum, and blackish bristly hairs. Pleurae with white tomentum. Abdomen black, somewhat yellowish in ground-color on the second and third segments, covered with white scale-like tomentum on the front and sides of the segments, on the posterior part of the segments with blackish tomentum. Legs brownish; on the inner side thickly, on the outer side thinly, covered with white tomentum. Wings nearly hyaline, the tomentum of the veins blackish. Length, 5–6 mm.

One specimen, Argus Mountains, April, 1891 (Koebele). Both this and the following species * belong to the genus *Culex* in the restricted sense of Lynch.

ORIGINAL DESCRIPTION OF CULEX MAGNIPENNIS:

Larvæ of this large and interesting species were taken in a shaded pool at Sodus Point, N. Y., Aug. 25, adults emerging the 29th. The female is remarkable on account of her large wings with broadly rounded anal lobes.

Description. *Male.* Proboscis long, curved, yellowish, specked with black, tip jet black. Palpi four segmented, longer than the proboscis, not plumose; basal segment globose, second sparsely, third moderately, fourth and fifth rather thickly clothed with small, brown, appressed scales, a few longer, black, ventral setae on the apical portion of the third and fourth segments. Antennae black, basal segment reddish, subglobular; others ringed with white and bearing basal whorls of long, black hairs, except the two apical ones, which are very long, slender and sparsely clothed with yellowish white plumes. Eyes greenish, deeply emarginate. Occiput sparsely clothed with golden yellow scales, a distinct line occurring along the posterior margin of the eyes, forming a median tuft. Prothorax with distinct median and sublateral black lines, sparsely clothed with short, golden yellow scales, slightly thicker on each side of the black lines, lateral portions bearing longer, black setae. Pleura sparsely clothed with short, yellowish scales. Scutellum rather prominent, irregularly fuscous, bearing long, yellowish setae; postscutellum naked, yellowish, rounded. Halteres: basal portion irregularly expanded, yellowish, transparent, apical part capitate, fuscous. Abdomen brown, mottled dorsally with dark brown, nearly black scales; laterally there is an indistinct row of yellowish scales; antepenultimate segment irregularly mottled with yellowish scales. Ventral surface suffused with orange yellow scales. Coxae clothed with golden yellow scales; femora yellowish beneath, dark brown above, rather thickly mottled with yellowish scales. Tibiae and tarsi black, except that the former are sparsely mottled with silvery white scales. Ungues of fore and mid legs unequal, one claw bidentate, the other unidentate, posterior claws simple. Wings hyaline, sparsely clothed with brownish scales; fringe slaty gray; posterior cross vein less than its own length from the mid cross vein; petiole of first submarginal cell about two thirds the length of the cell, that of the second about three fourths.

A rather large mosquito measuring about 5 mm., wing spread, about 10 mm.

Female. Antennæ dark brown, sparsely ornamented with very fine, yellowish white scales, and with short basal whorls of long, black hairs; basal segment subglobose with an inner patch of whitish scales. Proboscis longer than the abdomen, light brown, tipped with dark brown and ornamented laterally and ventrally with whitish or yellowish scales. Palpi short, brown, second joint and apex of terminal segment rather thickly clothed with yellowish white scales. Eyes coarsely granulate, dark green. Occiput rather densely clothed with yellowish scales, which form a line along the posterior margin of the eyes; erect black scales rather sparse. Prothorax light brown, with distinct, narrow, median and submedian lines, each bordered by a rather thick row of golden yellow scales; other portion of prothorax rather sparsely clothed with golden yellow scales and ornamented laterally with long, black setae. Pleura clothed with irregular patches of silvery white scales. Scutellum slaty brown, with median and lateral patches of golden yellow spines; postscutellum smooth, pinkish. Base of halteres semitransparent, pinkish, apical portion capitate, dark brown. Abdomen dark brown, profusely ornamented with orange and yellowish white scales in the form of broad, basal bands, the median portion being narrow and composed of orange scales, while the lateral portion extends almost the entire length of each segment and forms a nearly complete, lateral, yellowish white line; median and posterior portions of each segment dark brown with a few orange and yellowish white scales, the latter nearly covering the antepenultimate segment. Abdomen clothed laterally with long, silky, white hairs;

* The "following species" was *Culex* n. sp., Williston (=*tarsalis* Coq.).

Digitized by Google

ventral surface suffused with silvery white scales. Wings hyaline, clothed with dark brown scales, the fringe being a slaty gray and composed of scales of various length, as in C. pipiens, and the costa and subcosta flaked with silvery white scales. Petiole of first submarginal cell nearly one half the length of the cell, that of the second about three fourths. Posterior cross vein close to the mid cross vein and sometimes almost interstitial. Coxæ whitish, semitransparent; under surface of femora and tibiae whitish, other portions dark brown flecked with yellowish white scales and with apical white bands; tarsi black, sparsely flecked with white scales, claws simple.

Described from a freshly bred specimen.

The larva of this species was found in association with those of Anopheles punctipennis, Culex territans and C. sylvestris. It was easily recognized in the water by its size and dark color, it being about as large as the larva of C. cantans or C. cinereoborealis, and occurred singly in water several inches deep, coming to the surface only after rather long intervals.

Antennæ rather stout, slight curved and somewhat enlarged at the base, apical portion fuscous; a well developed tuft of plumose hairs slightly before the middle; two long subapical, two long apical spines and a short, stout process on the tip. Labial plate broadly rounded, triangular, with about 25 coarse teeth; mandible very similar to that of C. absobrinus. Thoracic and anterior abdominal segments clothed with numerous stout, black, plumose hairs, the larger abdominal segments bearing slightly compound, weakly plumose hairs. The comb consists of a triangular patch of about 40 scales arranged in about five irregular rows, each scale with a dark brown, basal, somewhat spatulate enlargement and terminated by an expanded, nearly colorless tip, bearing a series of rather fine, subequal, apical spines, smaller spines extending on each side to the extreme base. Air tube about four times as long as wide, slightly inflated and with two rows of pecten at the basal sixth, each consisting of about 14 closely set teeth bearing at their bases two or three conspicuous processes, pecten extended by a well marked row of 17 simple bristles reaching to the apical third or fourth. There is a posterior pair of compound, plumose hairs at the base of the air tube. Ventral tuft short and consisting of about 15 well developed, compound hairs attached to the barred area. Dorsal tuft composed of a very stout, compound hair and a smaller one with many more branches.

This larva closely resembles that of C. absobrinus and may be separated therefrom by the smaller number of comb teeth (which are also shorter and stouter), the greater number of basal processes on the pecten, and the decidedly different character of the labial plate. There are also other differences as will be seen by reference to the above description.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF CULISETA INORNATUS:

Female.—Proboscis rather long, uniform, the labellæ long, not thickened; vestiture of dark brown scales, rather thickly intermixed with pale ones; setæ rather numerous but very short and curved, those on labellæ more prominently outstanding. Palpi short, one-fifth as long as proboscis, dark scaled, tips white, and with rather numerous dark brown setæ. Antennæ moderate, the joints subequal; tori rather small, globose, light brown, a few whitish scales on inner side; shaft thickly clothed with pale pubescence, whorls at bases of segments sparse and short; second joint with a row of whitish scales on the inner side. Clypeus rounded, broad, rather small, dark brown, pruinose, nude. Eyes black. Occiput blackish, clothed rather sparsely with narrow, curved pale ochraceous scales and a number of black, erect, forked scales posteriorly, a narrow white margin along the eyes, cheeks covered with broad white scales; a row of black bristles near margins of eyes.

Prothoracic lobes small, remote, clothed with pale scales and a number of long brown bristles. Mesonotum dark brown, with two short narrow bare stripes anteriorly, vestiture rather sparse, composed of narrow, curved pale ochraceous scales intermixed with smaller golden-brown ones, the pale scales predominate along the margins, in three longitudinal lines on the disk, and oblique marks from the middle of the sides, around the ante-scutellar space and over the roots of wings; bristles rather numerous, on the disk principally inserted in longitudinal impressed lines. Scutellum trilobate, each lobe with a group of many long brown bristles, and a small patch of pale ochraceous,

Digitized by Google

narrow, curved scales. Postnotum nude, pale brown, somewhat pruinose, with an elliptical darker brown area on either side. Pleuræ and coxæ pale brown, slightly pruinose, rather sparsely clothed with elliptical, yellowish-white scales and a few ochraceous bristles.

Abdomen subcylindrical, depressed, truncate at tip; dorsal vestiture of blackish scales on apical halves of segments, pale ochraceous ones at bases, giving the effect of ill-defined transverse basal bands which widen laterally and join ill-defined, dirty white lateral stripes, last segment almost wholly pale scaled; first segment with a patch of pale scales and many pale setæ; venter wholly clothed with whitish ochraceous scales.

Wings rather broad, hyaline, with slightly iridescent reflection; second marginal cell longer than its petiole; the second posterior cell about equal to its petiole; basal cross-vein tending to lie in line with anterior cross-vein, distant therefrom less than half its own length; veins with long, narrow, outstanding scales and small, broader appressed ones, veins pale brown, vestiture dark brown mixed with a few whitish scales, which are most pronounced along subcostal and base of first vein. Halteres with pale ochraceous stems and blackish knobs.

Legs slender, rather long; vestiture of dark brown and pale ochraceous scales intermixed, the dark ones predominating on tarsal joints which appear nearly black; femora broadly pale scaled beneath; tibiæ pale scaled beneath and at the sides; femora and tibiæ narrowly whitish scaled at tips; tarsi unbanded. Claw formula, 0.0–0.0–0.0.

Length: Body about 6 mm.; wing 6.5 mm.

Male.—Proboscis straight, slightly thickened outwardly, clothed with pale brown and ochraceous scales, blackish toward tip. Palpi slender, longer than the proboscis; apical joint thickened, club-shaped; clothed with ochraceous and dark-brown scales, a few pale scales intermixed; a few long blackish bristles, especially at apex of long joint. Antennæ slender, sparsely plumose; last two joints long and ciliate, the others short, black, silvery white at apices; hairs of whorls long, black, not very dense. Coloration similar to the female, the larger narrow, curved scales of mesonotum distinctly golden yellow. Abdomen elongate, depressed, with rather short and irregular lateral ciliation; dorsally the basal yellowish banding is broader, darker, and less distinct than in the female, the lateral pale scales nearly concolorous, the last segment entirely ochraceous scaled; venter wholly clothed with yellowish white scales. Wings narrower than in the female, the stems of the fork-cells longer; cross-veins with distinctly less tendency to lie in line, the basal cross-vein often its own length from the anterior cross-vein; costal veins with few or no light scales. Claw formula, 2.1–2.1–0.0.

Length: Body about 5 mm.; wing 4.5 mm.

Genitalia (plate 34, fig. 230): Side-piece very stout, broad, rounded at apex; basal lobe expanded, rounded, setaceous, two of the apical spines very stout; outer lobe undeveloped, unrepresented by setæ. Terminal filament enlarged at base, rather short and stout with a small articulated terminal spine. Harpe elongated, slender, apex slightly expanded and divided into two large teeth and one small one on posterior margin. Harpago long, slender, and slightly curved, cylindrical, with a truncate open tip appearing like a slender tube with the tip open and bent, crested by a small angular filament with widely furcate apex, the whole not as long as the harpe. Unci obscure, appearing as a membranous plate. Setaceous lobes transverse, not prominent, each with a row of rather numerous, short, stout setæ. Posterior margin of preceding segment unarmed.

Larva, Stage IV (see figure of the entire larva, plate 78).—Head rounded, abruptly narrowed before eyes, a notch at insertion of antennæ, front margin arcuate. Antennæ rather small, cylindrical, sparsely spined, tuft a little before middle; two long and two shorter apical setæ and a long digit on a pedicel. Eyes

Digitized by Google

large, pointed. Both pairs of dorsal head-tufts and ante-antennal tufts multiple. Mental plate elongate triangular, with a central tooth and thirteen on each side, basal ones larger and more remote, last one small. Mandible quadrangular, elongate, part beyond collar especially prominent; two stout and two slender filaments before collar; a row of cilia; twenty filaments on outer margin in a double row, outer ones short, all bluntly tipped; dentition of five teeth on a process, the second one the longest, two rounded teeth before, three at base, a broad, serrate filament within; process below short, rather widely furcate, with hairs outwardly; basal angle blunt, a group of hairs within; a row of long hairs at base. Maxilla hemispherical, divided by a suture which runs inwardly, the inner part being parallel to base; inner half hairy toward margin, with a group of small hairs near angle of suture, two hair-tufts at tip; outer half sparsely haired without, two stout separate filaments situated near suture subapically. Palpus small, with four curved apical digits. Thorax rounded, wider than long, robust; hairs abundant, the single hairs rather long, prothoracic tufts multiple and nearly as long as head. Abdomen stout, the anterior segments short; hairs rather short, lateral hairs multiple to fifth segment, double on sixth, single on seventh, confused by subdorsal and subventral tufts, which are rather long on third to sixth segments. Tracheal tubes moderate, not band-shaped, flexuous posteriorly. Air-tube stout, tapered outwardly, two and a half times as long as wide; pecten of small teeth at base, becoming long hairs beyond basal third and running to apical fourth; single spine with three basal branches, except in the case of the outer hair-like spines; a large tuft close to base, almost at base of pecten. Lateral comb of eighth segment of many spines in a triangular patch; single spine with a round, blunt basal production, apical part long and widened a little outwardly, evenly fringed with long spinules. Anal segment about as long as broad, ringed by the plate; dorsal tuft a group of three hairs and brush on either side; a two-haired lateral tuft; ventral brush well developed, with small tufts preceding nearly to base. Anal gills small, shorter than the segment, tips abruptly pointed.

The eggs (plate 147, figs. 691 and 692) are laid in large boat-shaped masses, floating on the water and usually at the margin of the pool, where they are drawn by capillary action. They hatch within a few days. There are four larval stages, as usual. Several broods occur during the season, the females finally going into hibernation. The larvæ are inhabitants of permanent water, pools in stream beds or spring holes being the natural breeding-places. The species shows but slight tendency to domestication, being mainly confined to their original wild breeding-places except in certain instances, such as occur at Klamath Falls, Oregon, where a part of the lake had been cut off by banks of mud and refuse from the saw mills. Dr. Dyar found larvæ in old abandoned well-holes dug near the shore of a large marshy pond at Laguna, California (near Los Angeles). This is perhaps the beginning of a trend toward domestication. They generally occur in dark pools in stream-beds when the streams have gone partly dry. The water in these places is occasionally somewhat foul, but not so to a great degree. The adult females are not troublesome, being usually rare and not aggressive. They do not enter houses. The adults appear not to swarm for mating, certainly not to any marked extent. Copulation lasts for a considerable time. Dr. Dyar observed several pairs in copulation, resting on the under sides of some boards which were placed over water. The pairs remained united when the boards were overturned, and were captured in a cyanide bottle. They did not separate even in the bottle, though they became separated before the bottle was emptied. Both sexes of the pairs were standing on the board, facing in opposite directions.

Digitized by Google

Mr. Thibault has made the following observations in Arkansas:

"A winter mosquito, quite abundant in season. Bites frequently, preferring to bite horses and cattle to human beings. Very annoying to horses. Bites night or day, mostly evening and night. Breeds in rain-barrels and large and small permanent and transient bodies of water. Seems to prefer open fields to woods. Very early, January, February, March, and April. Not taken after May until October. Also November and December. Larvæ and pupæ found in February during warm weather. They swarm about low weeds at dusk, the swarms composed for the most part of males."

Culiseta inornatus extends throughout the whole of North America, except the extreme northern or arctic portions, but southward into Mexico and Cuba.

Beverly, Massachusetts, September 28, 1870 (G. Dimmock); New York (Dr. Felt's cotypes of *magnipennis*); Washington, District of Columbia, April 23, 1903 (W. V. Warner); Charleston, South Carolina, April, 1913 (R. L. Watson); Jacksonville, Florida, March 4, 1905 (H. G. Dyar), June 20, 1906 (H. Byrd); Havana, Cuba, December, 1903 (J. R. Taylor); Mobile, Alabama, March, 1905 (G. Dimmock); Agricultural College, Mississippi, April 12, 1903 (G. W. Herrick); Baton Rouge, Louisiana, November, 1902 (J. W. Dupree); Dallas, Texas, November 10, 1905 (W. E. Hinds); Paris, Texas, April 7, 1904 (A. A. Girault); Victoria, Texas, December 12, 1903 (A. W. Morrill); Hot Springs, Arkansas, November 26, 1900 (J. J. Curry); St. Louis, Missouri, July, 1904 (A. Busck); Urbana, Illinois, September 29, 1904 (F. Knab); Lawrence, Kansas (J. M. Aldrich); Onaga, Kansas (F. Crevecoeur); Madison, Wisconsin (S. J. Holmes); Brookings, South Dakota (J. M. Aldrich); Aweme, Manitoba, May 17, 1904, May 21, 1907, September 27, 1904, October 14, 1904 (N. Criddle); Regina, Saskatchewan, October 2, 1900 (J. Fletcher); Maple Creek, Saskatchewan, October 30, 1903 (T. N. Willing); Carnduff, Saskatchewan, May 28, 1901 (T. N. Willing); Olds, Saskatchewan, August 14, 1902 (T. N. Willing); Kinistino, Saskatchewan, July 10 (J. Fletcher); Shepard, Saskatchewan, July 24, 1901 (T. N. Willing); Calgary, Alberta (Dyar & Caudell); Medicine Hat, Alberta (Dyar & Caudell); Laggan, Alberta (Dyar & Caudell); Big Fork, Montana (Edith Ricker); Dillon, Montana, August 4, 1908 (R. A. Cooley); Moscow, Idaho (J. M. Aldrich); Boise, Idaho, August 1 (C. B. Simpson); Market Lake, Idaho (J. M. Aldrich); Klamath Falls, Oregon (Dyar & Caudell); Argus Mountains, California, April, 1891 (A. Koebele); Los Angeles, California (D. W. Coquillett; H. G. Dyar); Eureka, California (A. N. Caudell); Stanford University, California (Miss I. McCracken); Stockton, California (H. J. Quayle); San José, California, May 13, 1906 (———); Fresno, California (E. A. Schwarz); Ormsby County, Nevada, July 6 (C. F. Baker); Williams, Arizona, May 25 (H. S. Barber); Flagstaff, Arizona (H. S. Barber); Florissant, Colorado, June 20, 1907 (S. A. Rohwer); Boulder, Colorado, September (T. D. A. Cockerell); Denver, Colorado, August (E. S. Tucker); Santa Fé, New Mexico, July (T. D. A. Cockerell); Las Vegas, Hot Springs, New Mexico, August 12 (H. S. Barber); Mesilla Park, New Mexico, March (T. D. A. Cockerell); Fort Mojave, Arizona, March 25, 1911 (J. Henderson); Mexico City, Mexico (O. W. Barrett). Also reported from Pecos, New Mexico (Theobald); Scott, Arkansas (Thibault); Albany, New York (Felt).

This species has been generally known as *Culex consobrinus* Robineau-Desvoidy. Messrs. Coquillett and Aldrich have discussed the question of the identification of Desvoidy's species in the pages of the Canadian Entomologist,* the

* Aldrich, J. M. Do we know *Culex consobrinus* Desv.? Can. Ent., xxxv, 208-210, 1903.
Coquillett, D. W. Culex consobrinus again. Can. Ent., xxxv, 218, 1903.
Aldrich, J. M. Culex consobrinus: a rejoinder. Can. Ent., xxxv, 264-265, 1903.

Digitized by Google

former contending that this name should be applied to the present species, the latter that it was not so applicable, but probably the same as *Culex pipiens* Linnæus. After careful consideration we incline to agree with Mr. Aldrich; we have, accordingly, made the name *consobrinus* a synonym of *pipiens* and use the name *inornatus* for the present species. The adults are supplied with scales on the cross-veins, but these are sometimes very few in number, or altogether lost by abrasion, so that the species is liable to be confused with *impatiens*. It can be distinguished by the color as described under that species. The characteristic venation is less stable in these species than in the others of the genus, and individual males occur which are liable to be mistaken for a *Culex*. The large size, the weak plumosity of the antennæ, the form of the palpi and the poorly developed lateral ciliation of the abdomen, are an assistance to identification in such cases.

CULISETA MACCRACKENÆ Dyar & Knab.

Culex annulatus Williston (in part, not Schrank), U. S. Dept. Agr., Div. Ornith. and Mammal., No. Am. Fauna No. vii, 253, 1893.
Culex annulatus Ludlow (not Schrank), Journ. N. Y. Ent. Soc., x, 131, 1902.
Theobaldia annulata Theobald (in part, not Schrank), Mon. Culic., iii, 148, 1903.
Theobaldia annulata Aldrich (not *Culex annulatus* Schrank), Cat. No. Amer. Dipt., 126, 1905.
Culex annulatus Blanchard (in part, not Schrank), Les Moust., 280, 1905.
Theobaldia annulata Theobald (in part, not *Culex annulatus* Schrank), Gen. Ins., Dipt., 26 Fasc., 23, 1905.
Culiseta maccrackenæ Dyar & Knab, Proc. Biol. Soc. Wash., xix, 133, 1906.
Theobaldia annulata Coquillett (not *Culex annulatus* Schrank), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 22, 1906.
Theobaldia annulatus Quayle (not *Culex annulatus* Schrank), Univ. Cal. Agr. Exper. Stat., Bull. 178, 52, 1906.
Theobaldia annulata Ludlow (in part, not Schrank), Can. Ent., xxxviii, 326, 1906.
Theobaldia annulata Theobald (in part, not Schrank), Mon. Culic., iv, 277, 1907.
Culiseta maccrackenæ Dyar, Proc. U. S. Nat. Mus., xxxii, 123, 1907.
Theobaldia annulata Theobald (in part, not Schrank), Mon. Culic., v, 271, 1910.
Culiseta maccrackenæ Theobald, Mon. Culic., v, 611, 1910.

ORIGINAL DESCRIPTION OF CULISETA MACCRACKENÆ:

Proboscis black; thorax with two brown stripes, the vestiture yellowish over black. Wings with brown stains in the membrane where the scales form small black patches at cell, on cross-veins and at bases of forked cells; abdomen black with narrow whitish basal segmental bands, whitish scaled ventrally. Legs black, the femora pale at base and with a white ring before tip; tibiæ with a line of white scales on each side; hind tarsal joints banded with white at base nearly to middle.

1♂, 4♀, Stanford University, California, March, June 23, 1903 (Miss MacCracken); Eureka, Cal., June 8 (H. S. Barber); San Francisco, Cal., July 4, 1906 (Miss Ludlow).

Type.—Cat. No. 9961, U. S. Nat. Mus.

DESCRIPTION OF FEMALE AND MALE OF CULISETA MACCRACKENÆ (LARVA UNKNOWN):

Female.—Proboscis slender, long, hardly dilated towards tip; vestiture blackish dorsally, ventrally of light gray scales. Palpi about one-fifth the length of proboscis; black, a few white scales intermixed, two rings of white scales at segmentations, tip white scaled. Antennæ filiform, blackish; tori globose, with a distal depression, bright chestnut brown, pruinose, with a large patch of suberect, ovate, white scales on the inner side; second segment with a median whorl and scattered hairs, the rest covered with silky gray pubescence and basal whorls of rather short sparse hairs. Clypeus broad, rounded, brown, smooth, nude. Occiput blackish, clothed with narrow, curved, creamy scales, margin of eyes white, slender, erect, forked, dark brown scales dorsally, cheeks white scaled; a row of coarse brown bristles along margin of eyes, at vertex denser and projecting forward.

Prothoracic lobes clothed with whitish scales and brown bristles. Mesonotum brown, with darker mottlings, clothed with larger, narrow, curved, pale golden and whitish scales and much smaller dark brown scales; a pair of short

Digitized by Google

bare stripes at anterior margin, a pair of narrow bare stripes on posterior half, one on either side of antescutellar space midway towards lateral margin; the golden scales occupying a broad median stripe on anterior two-thirds, still larger whitish scales along anterior and lateral margins, broadly about antescutellar space and in lines on inner sides of posterior bare stripes, some irregular patches of pale scales sublaterally. Scutellum trilobate, densely whitish scaled, each lobe with a group of long black setæ. Postnotum nude, shining, brown. Pleuræ and coxæ brown, with patches of white scales and brown setæ.

Abdomen subcylindrical, truncate at tip; dorsal vestiture dull black, with rather narrow, basal, segmental white bands, slightly mesially produced on anterior segments; first segment with a patch of whitish scales and many pale hairs; last segment entirely white scaled; venter white scaled, the segments with diffused V-shaped markings of black scales, their points directed anteriorly.

Wings ample, hyaline, with diffused smoky spots at base of second vein, upon cross-veins and at bases of fork-cells; scales of veins dark brown, a few white ones intermixed along costa; all the scales on the veins narrow, the outstanding one much longer, scaling more dense on first vein, forks of second and fourth veins, at cross-veins, base of second vein, base and apex of third vein and outer half of sixth vein, producing the effect of spots at the bases of the fork-cells, at the cross-veins, at base of second vein and apices of third and sixth veins; basal cross-vein separated by much less than its own length from anterior cross-vein, the cross-veins with scales on the outer side; second marginal cell nearly twice as long as its stem; second posterior cell longer than its stem, and further from the base than the second marginal cell. Halteres pale, with black knobs.

Legs slender, rather long; vestiture black and white; femora black, white on the inner side except narrowly at base and tip, a broad, irregular, white, subapical ring; femora and tibiæ yellowish white tipped; mid tibiæ with a white line on inner side, front ones with a white line without; tarsal joints white ringed at their bases, broadly so on the hind legs, fore and mid tarsi without white ring on fifth joint; hind tarsi with traces of an outer longitudinal line on first two joints. Claw formula, 0.0–0.0–0.0.

Length: Body about 6 mm.; wing 6.5 mm.

Male.—Proboscis straight, long and slender, vestiture black mixed with light gray, under surface nearly all pale scaled. Palpi long and slender, slightly exceeding the proboscis, apex of long joint and penultimate joint thickened, last joint club-shaped; apex of long joint and last two joints with long dense black hairs, paler where the scaling is pale; vestiture of dark scales with a lustrous reflection, a white ring at base and middle of long joint and bases of the two distal joints. Antennæ plumose; last two joints long and slender, the others short, white, with thick black rings at the insertions of hair-whorls; hairs of whorls very long, blackish, moderately dense; tori large, pale ferruginous, pruinose. Coloration similar to the female. Occiput with the erect, forked scales, as well as the recumbent ones, whitish. Abdomen with the pale basal bands broader than in the female, last segment entirely white scaled above; lateral ciliation abundant, luteous. Wings narrow, less heavily scaled and less distinctly spotted than in the female, angulate base of third vein and the two cross-veins incident. Tarsal claw formula, 2.1–2.1–0.0.

Length: Body about 6.5 mm.; wing 5.5 mm.

Genitalia (plate 35, fig. 234): Side-pieces over twice as long as wide, stout, rounded at tips, a small subapical lobe bearing setæ and a larger, stoutly conical basal one bearing three stout spines; clasp-filament slender, rather small, uniform, with a small articulated terminal spine. Harpes columnar, with recurved divided tips; harpagones small, slender, rod-shaped, rounded at tip; unci

Digitized by Google

forming a long cylinder, reaching outer fourth of harpes, its inner revolute margin notched towards tip. Basal appendages represented by a diffused setose area. No spines on penultimate segment.

The larvæ inhabit pools in stream-beds. Miss McCracken found occasional specimens in San Francisquito Creek, which flows through the Palo Alto estate near San Francisco, California. She says: "The stream begins to get sluggish in the late spring or early summer, according to the season. *Spirogyra* and other filamentous algæ accumulate very rapidly. From the time these begin to grow, throughout the summer, the two prevailing fresh-water forms, *Culiseta incidens* and *Culex tarsalis*, are to be found breeding there. Here occasional specimens [of *Culiseta maccrackenæ*] were found." She has found the larvæ also, fully grown, in a pasture trough as early as February 14 (1903). It thus appears that the species may take advantage of conditions produced by man. It seems to be a rare species.

Coast region of California. Stanford University, California, March, June, 1903 (Miss McCracken); Eureka, California, June 3 (H. S. Barber); Presidio, San Francisco, California, July 4, 1906 (through C. S. Ludlow).

Culiseta maccrackenæ, with the following species (*dugesi* Dyar & Knab), were formerly considered to be conspecific with the European *Culiseta annulatus* Schrank; both differ in the absence of the white ring at the middle of the first tarsal joint, conspicuously present in that species, as well as in other details. They are, however, very nearly related and represent that species in North America.

CULISETA DUGESI Dyar & Knab.

Culex annulatus Osten Sacken (not Schrank), Biol. Centr. Amer., Ins., Dipt., i, 5, 1886.
Culex annulatus Williston (in part, not Schrank), U. S. Dept. Agr., Div. Ornith. and Mammal., No. Am. Fauna. No. 7, 253, 1893.
Culex annulatus Sanchez (not Schrank), Datos para la Zool. méd. mex., 135, 1893.
Culex annulatus Theobald (in part, not Schrank), Mon. Culic., i, 331, 1901.
Culex annulatus Blanchard (in part, not Schrank), Les Moust., 280, 1905.
Culiseta dugesi Dyar & Knab, Proc. Biol. Soc. Wash., xix, 134, 1906.
Theobaldia annulata Theobald (in part, not *Culex annulatus* Schrank), Mon. Culic., v, 271, 1910.
Culiseta dugesi Theobald, Mon. Culic., v, 611, 1910.

ORIGINAL DESCRIPTION OF CULISETA DUGESI:

Proboscis black with a few white scales; thorax with two brown stripes, the vestiture yellowish over black. Wings with brown stains in the membrane where the scales form small black patches on cell, on cross-vein and at bases of forked cells; abdomen black with narrow white basal segmental bands, whitish scaled ventrally. Legs black, sprinkled with whitish scales, the femora pale at base with a white ring before the tip; tibiæ with a line of white scales on each side; hind tarsal joints banded with white at base for less than one-fourth their length.

5 ♀, Guanajuato, Mexico, January 20, 1905 (A. Dugès); Mexico City, Mex., October 26, 1900 (S. Arara).

Type.—Cat. No. 9962, U. S. Nat. Mus.

DESCRIPTION OF FEMALE AND MALE OF CULISETA DUGESI (LARVA UNKNOWN):

Female.—Proboscis slender, uniform, labellæ tapering; vestiture of black scales, rather sparsely intermixed with white ones, setæ small, curved, somewhat more outstanding on labellæ. Palpi about one-fourth as long as proboscis; scales black, flat, appressed, a few white ones scattered, especially at tip and at base of long joint; rather numerous black outstanding setæ near base. Antennæ moderate, the joints subequal, densely clothed with brown cilia; tori globose, ochraceous, brown within; hairs of whorls sparse, rather short, with a whitish luster. Clypeus rounded triangular, nude, light brown. Occiput dark brown, clothed with narrow, curved whitish scales and black upright forked

Digitized by Google

ones, which are most numerous posteriorly; margin of eyes and lower part of side white scaled, a row of coarse black bristles along margins of eyes.

Prothoracic lobes small, remote, with whitish scales and brown bristles. Mesonotum dark brown, with two broad, bare, reddish brown stripes anteriorly, a pair of similar bare stripes on posterior half, at sides of antescutellar bare space; vestiture rather sparse, of larger, narrow, curved golden-yellow scales and patches of small dark brown ones intermixed, scales around ante-scutellar space, a line each side and over root of wing silvery whitish. Scutellum trilobate, the median lobe the more prominent, clothed with lanceolate silvery-whitish scales and with a group of black bristles on each lobe. Postnotum rather short, nude, pale brown. Pleuræ and coxæ pale testaceous, a blackish area between mid and posterior coxæ; vestiture of flat whitish scales in patches and a few fine pale bristles which are more numerous on the coxæ.

Abdomen subcylindrical, somewhat depressed dorsally, truncate apically; dorsal vestiture of black scales, a rather narrow band of white ones at base of each segment; first segment with black and white scales, and many fine pale hairs; a row of pale bristles at apices of segments; venter whitish scaled, with segmental, diffuse V-shaped patches of black scales, their points toward the anterior borders of the segments.

Wings ample; petiole of second marginal cell shorter than its cell, that of second posterior cell also shorter than its cell; basal cross-vein incident with anterior cross-vein; membrane hyaline, stained with brown at origin of second vein, region of cross-veins, a band across the bases of second marginal and second posterior cells, along the veins at the base of the fourth posterior cell and from there outwardly along the fifth vein to margin; scales black, appressed ones abundant, large, rather narrow, the outstanding scales sparse and slender; scales denser on infuscated areas; cross-veins scaled on outer side; fringe blackish at base, paler apically, at wing-tip the long scales distinctly ochraceous. Halteres with white stems and black knobs.

Legs moderate, slender, black scaled, intermixed with white ones; femora white beneath, on posterior femora forming a diffuse line which widens to a white spot before tip; tibiæ with a white line down inner side; and a white spot at base and apex; tarsi of fore and mid legs with a small white band at base of each joint, broader on outer side, absent on terminal joint; hind tarsi with broad rings, the fourth joint white on basal half, the fifth on basal third. Claw formula, 0.0–0.0–0.0.

Length: Body about 5.5 mm.; wing 6 mm.

Male.—Proboscis straight, moderately long and slender, black scaled, sprinkled with light gray. Palpi long, slightly exceeding the proboscis; apex of long joint and penultimate joint thickened, last joint club-shaped; apex of long joint and last two joints with long dense black hairs, the last two joints with broad pale rings at their bases, the long joint with a broad white ring at middle and a patch of white scales near base. Antennæ plumose; last two joints long and slender, the others short, pale, with black rings at insertions of hair-whorls; hair long, rather dense, black. Coloration similar to the female. Occiput with the forked scales pale. Abdomen elongate, subcylindrical, black scaled above, with basal segmentary white bands, the last segment nearly entirely white scaled; beneath nearly entirely white scaled. Wings much narrower than in the female, vestiture sparser, the stems of the fork-cells longer, basal cross-vein very near anterior cross-vein. Claw formula, 2.1–2.1–0.0.

Length: Body about 7 mm.; wing 6 mm.

Genitalia (plate 35, fig. 235): Side-pieces over twice as long as wide, slender, rounded at tips, a stoutly conical basal lobe bearing two stout spines; clasp-filament slender, rather long, uniform, with an articulated terminal spine.

Digitized by Google

Harpes columnar, with recurved divided tips; harpagones small, slender, rod-like with rounded tips; unci forming a long cylinder, reaching outer fourth of harpes, its inner revolute margin notched toward tip. Basal appendages represented by a diffuse setose area. Two small, stout spines on penultimate segment.

The life history and habits are unknown to us.

Known only from Mexico.

Guanajuato, January 20, 1905 (A. Dugès); Mexico City, October 26, 1900 (S. Arara); Leon (A. Dugès); Salvatierra (A. Dugès); Hidalgo, 9000 feet (Mann & Skewes, through B. Preston Clark); Coyoacan, July, 1909 (A. L. Herrera). Also reported from Ciudad, in Durango (Osten Sacken).

Culiseta dugesi represents the Californian *maccrackenæ* on the table-land of Mexico. It is very nearly related to that species, but apparently specifically distinct. It was originally confounded with the European *annulatus*, to which we have referred under the discussion of *maccrackenæ*. Our correspondents have not sent us any information concerning the early stages of the species and Mr. Knab, who visited Mexico, did not find it in the tropical parts of the country.

CULISETA ALASKAENSIS (Ludlow).

Culex annulatus Osten Sacken (not Schrank), Cat. N. A. Dipt., 2 ed., Smiths. Misc. Colls., xvi, 18, 1878.
Theobaldia alaskaensis Ludlow, Can. Ent., xxxviii, 326, 1906.
Theobaldia alaskaensis Theobald, Mon. Culic., v, 373, 1910.

ORIGINAL DESCRIPTION OF THEOBALDIA ALASKAENSIS:

Female.—Head dark brown, covered with white curved scales, and dark brown forked scales on the occiput, with flat white scales on the sides, and extending down under the labium; a few brown bristles around and between the eyes; antennae dark brown, heavy white pubescence and sparse brown verticels, first and second joints with some white flat scales, basal joint testaceous, with a few white flat scales on the median side; palpi dark brown, sparsely covered with white flat scales and a few hairs; proboscis yellowish from base about two-thirds its length, the apical third dark brown, the whole sparsely covered with thin white flat scales; the effect of the proboscis under the hand lens is not, however, of a band, the proximal part being merely of golden-brown tinge, and the distal part darker; clypeus brown; eyes dark blue-green.

Thorax dark brown; protheracic lobes with a few white curved scales; mesonotum sparsely clothed with rather large white curved scales, and some brown bristles, which do not, however form any ornamentation except for two tiny faint white submedian spots nearly midway of the mesothorax, which only show in rather perfect specimens; when denuded there is a suggestion of a dark median line; pleura dark brown, with white flat spatulate scales; scutellum dark brown, the white curved scales being grouped distinctly on the lobes, the interlobular part naked; eight long brown marginal bristles on mid and six on the side lobes, a few lighter bristles above; metanotum brown.

Abdomen dark brown, with dark brown scales and white bands, mostly basal, but sometimes very slightly apical, and in some specimens develop into very narrow lateral spots, especially on the distal segments; occasional white scales scattered through the brown; second segment with a narrow median line, apical almost wholly white-scaled; apices and sides of segments rather profusely supplied with light-coloured hairs; venter mostly white scaled.

Legs: Coxæ and trochanters all brown, with white scales; femora dorsally brown, scaled with a sprinkling of white scales, ventrally white, a small light apical spot, but no ring as in *annulata*; tibiæ and metatarsi also brown, spirkled with white, with small light apices; first and second tarsal joints in all the legs with narrow basal light (ochraceous) spots not always amounting to bands; remainder of tarsi brown, except on the hind legs, where sometimes the base of 3rd and 4th joints have a few white scales, not noticeable with a hand-lens; ungues large, simple and equal.

Wings brown; costa, subcosta and first long veins heavily scaled with long truncate scales, mostly brown, but sprinkled with a few white scales; these are also found on the stem of the fifth; the second, third, fourth and sixth veins clothed with

Digitized by Google

long, slender, brown scales; lateral scales narrowly lanceolate, median truncate but slender, aggregated so as to form four small but distinct spots, occurring at the root of the second, the bases of the fork cells, and at junction of cross veins; first submarginal cell about one-third longer and a trifle narrower than second posterior, both stems about one-half the length of the latter; cross-veins nearly of one length, and almost in a line; ventral scales long and slender; halteres, light stem, dark knobs.

Male.—Much as female; antennæ give banded appearance; verticels light brown; palpi as long or longer than proboscis, dark brown, with a light band at base of apical joint, plumes brown except at the light band, where they are yellowish; very marked contraction at the distal end of the second abdominal segment, giving a "wasp waist" effect; legs as in female, but the bands distinct and fairly wide, especially on the hind legs, where there is a narrow band on the third tarsal; in the fore and mid legs this joint has only a suggestion of a band; fourth joint brown; ungues large, unequal in fore and mid legs, the larger biserrate and the smaller uniserrate, in hind legs large, simple and equal.

Length, 10–11 mm. Habitat, Fort Egbert, Alaska. Taken May–June.

Type: No. 9959, U. S. N. M.

Described from five females and one male sent me by 1st Lieut. J. R. Bosley, Asst. Surg. U. S. Army, in two collections from Fort Egbert, Alaska.

It is closely related to both *annulata*, Shrank, *Fulbici*, No., and *penetrans*, Desvoidy. Differs from the former in that it has only the tiny spot on the thorax; there is no band on the female palpus, and only one on the male; there is no ring on the femur, and the leg bands are much narrower and ochraceous rather than white.

It differs from *Fulbici* also in the thoracic marking; the palpi are only white scaled; the median stripe on the second abdominal segment; the tarsal bands are basal only, and the mid ungues of the male have only one tooth on the smaller. It apparently reverses the colouring of *penetrans*, and has only four "maculis plus minusve distinctis."

Description of Female and Male of Culiseta alaskaensis (Larva Unknown):

Female.—Proboscis slender, long, hardly dilated towards tip, labellæ long, tapering; vestiture dark brown with scattering light-gray scales, particularly towards base beneath. Palpi short, about one-fifth the length of proboscis; black scaled, a few white scales intermixed, particularly at the segmentations, tips white. Antennæ filiform; tori globose, with an apical depression, bright chestnut brown; second segment with a median whorl and scattered hairs, the others subequal, with basal whorls of sparse rather short setæ and silky gray pubescence. Clypeus convex, rounded triangular, dark brown, pruinose. Occiput blackish, rather sparsely clothed with narrow, curved whitish scales, slender, erect, forked blackish brown scales, most numerous posteriorly, margins of eyes and cheeks white scaled; many coarse black bristles towards margins of eyes, most numerous dorsally.

Prothoracic lobes remote with whitish scales and pale bristles. Mesonotum very deep brown, vestiture of larger, narrow, curved, creamy-white and smaller dark-brown scales, the whitish scales forming confused lines submedianly and near lateral margins, two distinct patches on the disk, others around antescutellar space and over roots of wings. Scutellum trilobate white scaled, with three groups of long black setæ. Postnotum nude, shining dark brown. Pleuræ and coxæ brown and blackish, with patches of white scales.

Abdomen subcylindrical, truncate at tip; black scaled above, the segments with white basal bands, occupying almost a third of the segments; first segment with a patch of white scales and numerous pale bristles; venter white scaled.

Wings ample, hyaline, with smoky spots at base of second vein and upon cross-vein; scales of veins dark brown, a few light colored scales intermixed on the costa; both sets of scales on veins narrow, the outstanding ones much longer; scaling more dense and of broader, truncate scales on first vein, dense on furcations of second and fourth veins, at cross-veins, and at base of second vein, producing the effect of spots in those places; cross-veins incident, scaled on

Digitized by Google

outer side; second marginal cell less than twice as long as stem; second posterior cell longer than its stem and farther from the base than the second marginal cell. Halteres whitish, with black knobs.

Legs black, mottled with dull white; front femora mottled black and white beneath; middle and hind femora whitish beneath, except at apex; knees white; tibiæ tipped with white; on front and mid legs the bases of second, third, and fourth tarsal joints rather narrowly white ringed; hind feet with second and third joints broadly white ringed, the fourth narrowly so; apices of first and second tarsal joints on all the legs narrowly white scaled, the first joint with a white mark at base above. Claw formula, 0.0–0.0–0.0.

Length 6.5 mm.; wing 7 mm.

Male.—Proboscis straight, long and slender, uniform; vestiture black, light-gray scaled beneath, nearly to tip. Palpi slightly longer than the proboscis, the outer part of long joint and the last two joints thickened and bearing long hairs, the last joint only moderately thickened; vestiture blackish, a very narrow pale ring at middle of long joint and patches of white scales at bases of last two joints. Antennæ plumose; last two joints long and slender, black, the others short, light colored, with thick black rings at the insertions of the hair-whorls; hairs very long, rather dense, brown. Abdomen with the pale basal bands as in the female; last segment entirely white scaled above; claspers dark scaled; venter entirely light scaled, two large dark patches at sides towards hind angles of segments; lateral ciliation long, abundant, luteous. Wings narrow, the stems of the fork-cells longer than in the female, cross-veins nearly incident. Tarsal claw formula, 2.1–2.1–0.0.

Length: Body about 7 mm.; wing 6.5 mm.

Genitalia (plate 35, fig. 233): Side-piece stout, tapering gradually to a broadly rounded apex; basal lobe wide, expanded, setose, two very stout long setæ contiguous at summit; outer lobe slight, represented by a small, densely haired area which is slightly elevated. Clasp-filament slightly enlarged at base, tapering outwardly, with a small terminal articulated spine. Harpe stout, with broadly expanded base, apical portion curved, scarcely dilated, with a terminal point and one or two small outer spines. Harpagones apparently wanting, perhaps very membranous, invisible. Unci stout, rather slender, covolute, acute apically with recurved points. Basal lobes rounded, bearing tufts of long, fine, dense setæ. The genitalia are extremely similar to those of the European *Culiseta annulatus* Schrank, as figured by Dr. Felt (Bull. 97, N. Y. State Museum, p. 480, pl. 12, fig. 2, 1905).

No observations have been made upon the habits or early stages of this species.

North America in the northwestern part of the continent, from the mountains of western Canada northward.

Fort Egbert, Eagle, Alaska, May 30, June 2, 1906 (Miss Ludlow's cotypes); Koyukuk River, Alaska, latitude 67 to 69, longitude 151, 1901 (W. J. Peters); Laggan, Alberta (J. Fletcher); Banff, Alberta (N. B. Sanson).

Osten Sacken reports what is probably this species, under the name *Culex annulatus,* from the Mackenzie River.

This species comes close to the European *Culiseta annulatus,* by the character of the male genitalia, but the white markings are much less developed, the Alaskan form lacking the white rings subapically on the femora and medianly on the first tarsal joints. We therefore hold it as a separate species.

Digitized by Google

Genus MANSONIA Blanchard.

Tæniorhynchus Arribálzaga (in part), Rev. Mus. de La Plata, i, 374; ii, 147; 1891.
Tæniorhynchus Theobald (not Arribálzaga), Journ. Trop. Med., ii, 235, 1901 (without species).
Tæniorhynchus Theobald (not Arribálzaga), Mon. Culic., ii, 190, 1901.
Panoplites Theobald (not Gould), Journ. Trop. Med., iv, 235, 1901 (without species).
Panoplites Theobald (not Gould), Mon. Culicid., ii, 173, 1901.
Mansonia Blanchard, C. R. Soc. de Biol., liii, 1045, 1901.
Mansonia Neveu-Lemaire, C. R. Soc. Biol., liv, 1331, 1902.
Tæniorhynchus Neveu-Lemaire (not Arribálzaga), C. R. Soc. de Biol., liv, 1331, 1902.
Mansonia Neveu-Lemaire, Mém. Soc. Zool. France, xv, 213, 1902.
Tæniorhynchus Neveu-Lemaire (not Arribálzaga), Mém. Soc. Zool. France, xv, 215, 1902.
Panoplites Giles (not Gould), Gnats or Mosq., 2 ed., 350, 1902.
Tæniorhynchus Giles (not Arribálzaga), Gnats or Mosq., 2 ed., 358, 1902.
Tæniorhynchus Felt (not Arribálzaga), N. Y. State Mus., Bull. 79, 391c, 1904.
Tæniorhynchus Lutz (not Arribálzaga) in Bourroul, Mosq. do Brasil, 60, 1904.
Mansonia Lutz in Bourroul, Mosq. do Brasil, 60, 1904.
Tæniorhynchus Giles (in part), Journ. Trop. Med., vii, 381, 1904.
Mansonia Blanchard, Les Moustiques, 375, 1905.
Tæniorhynchus Blanchard (not Arribálzaga), Les Moustiques, 381, 1905.
Tæniorhynchus Felt (not Arribálzaga), N. Y. State Mus., Bull. 97, 487, 1905.
Coquillettidia Dyar, Proc. Ent. Soc. Wash., vii, 45, 47, 1905.
Tæniorhynchus Dyar (not Arribálzaga), Proc. Ent. Soc. Wash., vii, 47, 1905.
Tæniorhynchus Theobald (not Arribálzaga), Gen. Ins., Dipt., 26 fasc., 15, 30, 1905.
Mansonia Theobald, Gen. Ins., Dipt., fasc. 26, 15, 31, 1905.
Mansonia Theobald, Mosq. or Culic. Jamaica, 7, 11, 1905.
Tæniorhynchus Dyar & Knab (not Arribálzaga), Journ. N. Y. Ent. Soc., xiv, 184, 1906.
Tæniorhynchus Coquillett (not Arribálzaga), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 1906.
Mansonia Coquillett (in part), U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 16, 1906.
Tæniorhynchus Dyar & Knab (not Arribálzaga), Can. Ent., xxxix, 48, 1907.
Mansonia Dyar & Knab (in part), Can. Ent., xxxix, 48, 1907.
Tæniorhynchus Howard (not Arribálzaga), Osler's Modern Medicine, i, 372, 1907.
Chrysoconops Theobald (in part, not Goeldi), Mon. Culic., iv, 491, 1907.
Mansonia Theobald, Mon. Culic., iv, 494, 1907.
Tæniorhynchus Theobald (not Arribálzaga), Mon. Culic., iv, 483, 1907.
Mansonia Autran, Anal. Dep. Nac. Hig., xiv, 23, 1907.
Tæniorhynchus Autran (not Arribálzaga), Anal Dep. Nac. Hig., xiv, 25, 1907.
Tæniorhynchus Williston (not Arribálzaga), Man. No. Am. Dipt., 3 edit., 108, 1908.
Mansonia Williston (in part), Man. No. Am. Dipt., 3 edit., 107, 1908.
Tæniorhynchus Peryassú (not Arribálzaga), Os Culic. do Brazil, 35, 1908.
Mansonia Peryassú, Os Culic. do Brazil, 35, 1908.
Tæniorhynchus Theobald (not Arribálzaga), Mon. Culic., v, 117, 418, 1910.
Chrysoconops Theobald (in part, not Goeldi), Mon. Culic., v, 117, 433, 1910.
Mansonia Theobald, Mon. Culic., v, 117, 446, 1910.
Mansonia Dyar & Knab, Ent. News, xxi, 259, 1910.
Tæniorhynchus Edwards (not Arribálzaga), Bull. Ent. Research, ii, 251, 1911.
Rhynchotaenia Brèthes, Anal. Mus. Nac. Buenos Aires, Ser. 3, xiii, 470, 1911.
Tæniorhynchus Theobald, Novæ Culicidæ, i, 19, 1911.
Pseudotaeniorhynchus Theobald, Novæ Culicidæ, i, 19, 1911.
Tæniorhynchus Edwards (not Arribálzaga), Bull. Ent. Res., iii, 25, 1912.
Tæniorhynchus Edwards (not Arribálzaga), Entomol., xlv, 193, 1912.
Tæniorhynchus Theobald (not Arribálzaga), 2d Rept. Director Vet. Res., Union S. Afr., 315, 1913.
Pseudotaeniorhynchus Theobald, 2d Rept. Director Vet. Res., Union of S. Afr., 315, 340, 1913.

The type species are: Of *Tæniorhynchus* Arribálzaga, *Culex tæniorhynchus* Wiedemann; of *Panoplites* Theobald (not Gould), *Culex titillans* Walker; of *Mansonia* Blanchard, *Culex titillans* Walker; of *Coquillettidia* Dyar, *Culex perturbans* Walker; of *Rhynchotaenia* Brèthes (by present designation), *Tæniorhynchus fasciolatus* Arribálzaga; of *Pseudotæniorhynchus* Theobald, *Tæniorhynchus fasciolatus* Arribálzaga.

Digitized by Google

GENERIC DIAGNOSIS OF ADULT:

Proboscis moderately long, uniform; palpi short in the female, but not extremely so, long in the male, as long or longer than the proboscis; antennæ filiform in the female, the joints subequal with basal whorls of rather sparse short hairs, plumose in the male, the last two joints long, the others short, enlarged at insertions of hair-whorls; tori small. Clypeus nude. Prothoracic lobes well separated. Postnotum nude. Abdomen in the female subcylindrical, depressed, truncate at tip; in the male elongate, with abundant lateral ciliation. Wings moderate. Claws simple in the female, front and middle ones toothed and unequal in male. Tibial scraper of the hind feet with a row of about eight spines. Female with three separate receptacula seminis.

GENERIC DIAGNOSIS OF LARVA:

Head rounded, flattened, the antennæ very long, with a large hair tuft towards the basal third. Air-tube with basal half rounded conical, outer half very slender; a crown of hooks at the tip; no pecten, a single pair of long hair tufts near base. Lateral comb of eighth abdominal segment a row of single spines. Anal segment ringed by the plate; dorsal tuft and ventral brush large.

The genus *Mansonia* extends throughout America, except the boreal regions, and is reported from the warmer parts of the Old World. The life habits are such as to limit its distribution to swampy regions.

The species were originally included under *Culex*. In 1891, Lynch-Arribálzaga founded his genus *Tæniorhynchus*, type not stated, but including three species, *Culex tæniorhynchus*, Wiedemann, *Tæniorhynchus confinnis* Arribálzaga, and *T. fasciolatus* Arribálzaga, in the order named. The first species, *tæniorhynchus* Wied., should have been considered the type of the genus, not only from being the first, but also by absolute tautonomy (Stiles, Public Health and Marine-Hospital Service, Hygien. Lab., Bull. 24, 27, Rule 5, 1905). However, Theobald concluded that the specimens before Arribálzaga could not have been *Culex tæniorhynchus* Wiedemann, but must have been *Culex titillans* Walker, which name Arribálzaga erroneously cites as a synonym of *Culex tæniorhynchus* Wiedemann. Theobald then proposed a new name, *Panoplites*, founded on *titillans* as type; he cited as the type of the genus *Tæniorhynchus*, *T. fasciolatus* Arribálzaga, the last species of the original genus, under the rule that where the type is not mentioned a subsequent author may select any of the original species as type. We have not adopted this proceeding, considering the question of identification to have been wrongly raised and the type of *Tæniorhynchus* Arribálzaga fixed as *Culex tæniorhynchus* Wiedemann by tautonomy. It thus is disposed of as a synonym of *Aëdes*. The name *Panoplites* was found to be preoccupied and changed to *Mansonia* by Blanchard, in honor of Sir Patrick Manson, an eminent English physician. Recently Brèthes, recognizing that the generic name *Tæniorhynchus* could not be used with *T. fasciolatus* as the type, proposed the name *Rhynchotænia*. The same course of reasoning led Theobald to propose the name *Pseudotæniorhynchus*. As, however, the genera *Mansonia* and *Tæniorhynchus* as defined by Theobald are not distinct, these terms become synonyms of *Mansonia*.

Mansonia was originally founded on scale characters, the wing scales being broad and peculiarly shaped in some of the species. Neveu-Lemaire recast the genus, defining it on the comparatively long palpi of the female. The character, however, is not a stable one and is repeated in other genera; we have therefore had recourse to other characters. The adult characters are rather weak, but the genus is well marked by larvæ and male genitalia.

As the genera *Mansonia* and *Tæniorhynchus* were defined on scale characters, principally on the shape of the wing-scales, wholly unrelated species were associated under these concepts. The forms from within our faunal limits that have been assigned to *Mansonia* and *Tæniorhynchus* by different authors will be found in this work assigned to their proper genera, and need not be dis-

Digitized by Google

cussed here in detail. Edwards has recently done excellent work in this direction with the Old World forms, particularly the African ones (The African species of *Culex* and allied genera, Bull. Ent. Res., ii, 241-268, 1911; A synopsis of the species of African Culicidæ, other than Anopheles, Bull. Ent. Res., iii, 1-53, 1912). Neveu-Lemaire, in an article on the receptacula seminis of female mosquitoes (Sur les réceptacles séminaux de quelques culicides, Bull. Soc. Zool. France, xxvii, 172-175, 1902), indicated two of these organs for the genus *Mansonia*, basing his statement upon an examination of the African *M. uniformis*. Dyar and Knab found that the type species of *Mansonia* (*titillans*) has three receptacula seminis, as do the species properly associated with it, and have indicated that the forms with two receptacula should be segregated under *Mansonioides* (Ent. News, xxi, 262, 1910). This course has been adopted by Edwards (Bull. Ent. Res., ii, 251, 253, 1911). It should be noted that while in such forms as *Mansonia fasciolatus* and *M. perturbans* the three receptacula are of nearly equal size, in *M. titillans* one of them is very much smaller, thus representing a step in the direction of *Mansonioides*. Edwards has recently shown that the larva of *Mansonioides africanus* (Theo.) is very similar to that of *Mansonia* (Bull. Ent. Res., iii, 377, 378, 1912) and it is possible that further studies will result in the fusion of these two genera.

The species typified by *Mansonia perturbans*, to which group belong *fasciolatus* and *arribalzagæ*, deposit the eggs in boat-shaped masses on the surface of water and resting against the stems of aquatic vegetation. The eggs are laid in swamps where there is abundance of vegetation. The larvæ on hatching descend to the bottom, enter the mud, and become attached to the roots of aquatic plants by their air-tubes. They cut the surface of the roots with their sharp tubes and obtain their supply of air from the vascular tissue of the roots. The development is slow, and the larvæ never come to the surface. The pupæ also remain attached to the roots by their breathing tubes which are modified for this purpose. The exact manner of the emergence of the imago has not been described. The adult females bite severely. They fly to a considerable distance from their breeding-places. In temperate latitudes there is but a single generation in the year, the winter being spent in the larval state, partly grown, at the bottoms of swamps.

The species typified by *Mansonia titillans* have very similar habits, the larvæ likewise attaching themselves to the roots of aquatic plants by the air-tube. The egg-laying of this group has been observed by H. W. B. Moore, too late for inclusion in this work.

Tables of the Species.

Adults, structure and coloration.

1. Tarsi pale, without white rings..... *ochropus* Dyar & Knab (p. 504)
   Tarsi with white rings..... 2
2. Hind tibia with a white ring beyond the middle..... 3
   Hind tibia without white ring..... 4
3. Hind tarsi with white ring at middle of first joint... *perturbans* Walker (p. 505)
   Hind tarsi without such a white ring..... *nigricans* Coquillett (p. 511)
4. Wing-scales all blackish 5
   Wing-scales peppered, blackish and whitish..... 6
5. Lateral abdominal spots silvery..... *coticula* Dyar & Knab (p. 515)
   Lateral abdominal spots not silvery..... *fasciolatus* Lynch Arribálzaga (p. 512)
6. Color predominatingly dark..... *titillans* Walker (p. 516)
   Color predominatingly yellowish..... *flaveolus* Coquillett (p. 521)

Adults, male genitalia.

1. Basal lobe of clasp moderate, without apical spines.. *perturbans* Walker (p. 507)
   Basal lobe of clasp long, with apical spines..... 2
2. Fork of clasp-filament subbasal, slender..... *titillans* Walker (p. 518)
   Fork of clasp filament medial, thick..... *flaveolus* Coquillett (p. 523)

Digitized by Google

We have no males of *ochropus* Dyar & Knab, *nigricans* Coquillett, *coticula* Dyar & Knab, and *fasciolatus* Arribálzaga, and are obliged to omit the names from the table.

LARVÆ.

1. **Anal segment moderate**..... ***perturbans*** **Walker (p. 507)**
   Anal segment much elongated..... ***titillans*** **Walker (p. 518)**

The following species are omitted, as the mature larvæ are unknown: *ochropus* Dyar & Knab; *nigricans* Coquillett; *coticula* Dyar & Knab; *fasciolatus* Arribálzaga; *flaveolus* Coquillett.

MANSONIA OCHROPUS (Dyar & Knab) Dyar & Knab.

Culex ochropus Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 100, 1907.
Mansonia ochropus Dyar & Knab, Ent. News, xxi, 264, 1910.
Culex ochropus Theobald, Mon. Culic., v, 614, 1910.

ORIGINAL DESCRIPTION OF CULEX OCHROPUS:

Dark brown, the head and thorax rather sparsely clothed with light yellow scales and brownish bristles, not forming any distinct ornamentation, but contrasting with the brown membrane below; abdomen clothed with pale testaceous scales, unbanded. Legs pale testaceous, the ends of the joints, as well as the ends of the proboscis and palpi brownish. Wing scales pale brown, dense. Claws simple.

One ♀, Centre Harbour, New Hampshire, July 19 (H. G. Dyar).

Type.—Cat. No. 10261, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF MANSONIA OCHROPUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, subcylindrical, uniform, labellæ conically tapered; vestiture of rather rough shining brownish ochraceous scales; setæ minute, curved, dark, those on labellæ more prominently outstanding. Palpi about one-fourth the length of proboscis, roughly clothed with brownish ochraceous scales and numerous stiff black bristles. Antennæ moderate, with basal joints of shaft considerably shorter than apical ones, rugose, pilose, blackish brown, the second joint slightly longer than the succeeding one, fusiform; tori subspherical, with a cup shaped apical excavation, testaceous shading to brown on inner side, with a large patch of pale ochraceous scales; hairs of whorls sparse, moderate, black. Clypeus, short, broadly rounded, brown, slightly pruinose, nude. Eyes black. Occiput brown, clothed with narrow, curved, pale yellowish, shining scales, and many erect, forked pale brown ones; broader, more whitish scales along ocular margins and on the cheeks; setæ along ocular margin black below, pale at vertex.

Prothoracic lobes elliptical, remote, dorsally, rather densely clothed with narrow, curved pale scales and pale brown bristles. Mesonotum brown, with two rather broad, indistinct bare lines; vestiture of large, narrow, curved, shining yellowish-white scales and with numerous golden-brown bristles. Scutellum trilobate, pale brown, clothed with pale scales, each lobe with a group of brown bristles. Postnotum elliptical, prominent, brown, nude, smooth. Pleuræ and coxæ pale brown, with patches of elliptical whitish scales and rows of brown bristles.

Abdomen subcylindrical, truncated posteriorly; dorsal vestiture light brown with a whitish luster, a row of triangular, basal, segmental, lateral, pale yellowish spots, larger posteriorly; first segment with a patch of soiled yellowish scales and many yellow setæ; venter whitish scaled; setæ at apices of segments rather numerous, pale brown.

Wings ample, hyaline; petiole of second marginal cell over half as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein about twice its own length from anterior cross-vein; veins pale ochraceous; scales abundant, long, dense, nearly obscuring the membrane apically, pale brown with

Digitized by Google

a whitish reflection, of two kinds, long lanceolate and shorter, broader blunt-ended scales. Halteres pale, with testaceous knobs.

Legs rather stout, pale testaceous, scales with a whitish reflection, the brown bristles contrasting. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 4.5 mm.

The life history and habits are unknown. The single specimen was taken flying in the daytime in woods.

New Hampshire.

Center Harbor, July 19, 1902 (H. G. Dyar).

Mansonia ochropus is known only by one female specimen. This specimen may possibly prove to be an abnormally colored specimen of *Mansonia perturbans* Walker. The peculiar pale scaling with silky luster suggests an aberration, but the entire absence of the characteristic markings of *M. perturbans* compels us to retain the species as a valid one for the present.

MANSONIA PERTURBANS (Walker) Dyar.

Culex perturbans Walker, Ins. Saund., Dipt., 428, 1856.
Culex excrucians Howard (not Walker), U. S. Dept. Agr., Div. Ent., Bull. 4, n. s., 22, 1896.
Culex excrucians Coquillett (not Walker), U. S. Dept. Agr., Div. Ent., Circular 40, 2d ser., 6, 1900.
Culex excrucians Howard (not Walker), U. S. Dept. Agr., Div. Ent., Bull. 25, n. ser., 20, 1900.
Culex tæniorhynchus Giles (in part, not Wiedemann), Gnats or Mosq., 245, 1900.
Culex excrucians Howard (not Walker), Mosquitoes, 238, 1901.
Culex perturbans Laveran, C. R. Soc. de Biol., liii, 567, 1901.
Tæniorhynchus richardii Theobald (in part, not *Culex richiardii* Ficalbi), Mon. Culic., ii, 194, 1901.
Tæniorhynchus perturbans Theobald, Mon. Culic., ii, 201, 1901.
Tæniorhynchus perturbans Giles, Gnats or Mosq., 2 ed., 366, 1902.
Tæniorhynchus perturbans Blanchard & Dyé, C. R. Soc. de Biol., lv, 570, 1903.
Culex perturbans Smith, N. J. Agr. Exp. Stat., Bull. 171, 37, 1904.
Culex perturbans Smith, Rept. on Mosquitoes, N. J. Agr. Exp. Stat., 213, 1904.
Culex perturbans Dyar, Proc. Ent. Soc. Wash., vi, 40, 1904.
Tæniorhynchus perturbans Giles, Journ. Trop. Med., vii, 382, 1904.
Culex perturbans Dyar & Currie, Proc. Ent. Soc. Wash., vi, 218, 1904.
Tæniorhynchus perturbans Felt, Bull. 79, N. Y. State Mus., 339, 391d, 1904.
Culex perturbans Britton & Viereck, Rept. Conn. Agr. Exp. Sta. 1904, 270, 272, 1905.
Tæniorhynchus perturbans Felt, Bull. 97, N. Y. State Mus., 488, 1905.
Coquillettidia perturbans Dyar, Proc. Ent. Soc. Wash., vii, 47, 1905.
Tæniorhynchus perturbans Blanchard (in part), Les Moustiques, 386, 1905.
Culex perturbans Smith, Rept. N. J. Agr. Coll. Exp. Stat. for 1905, 676, 1906.
Tæniorhynchus perturbans Dyar & Knab, Journ. N. Y. Ent. Soc., xiv, 184, 1906.
Tæniorhynchus perturbans Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 24, 1906.
Tæniorhynchus perturbans Dyar, U. S. Dept. Agr., Bur. Ent., Circular 72, 3, 1906.
Culex perturbans Howard, Osler's Modern Medicine, i, 376, 1907.
Tæniorhynchus perturbans Theobald, Mon. Culic., iv, 486, 1907.
Culex perturbans Smith, Ent. News, xix, 22, 1908.
Culex (Tæniorhynchus) perturbans Viereck, 1st Ann. Rept. Comm. Health Pa., 470, 1908.
Culex perturbans Grossbeck, Ent. News, xix, 473, 1908.
Culex perturbans Grossbeck, Rept. N. J. Agr. Exp. Station, 1907, 546, 1908.
Culex perturbans Smith, Rept. N. J. Agr. Exp. Station, 1908, 410, 1909.
Mansonia perturbans Dyar, Proc. Ent. Soc. Wash., xi, 145, 1909.
Mansonia perturbans Knab, Ent. News, xx, 387, 1909.
Mansonia perturbans Dyar & Knab, Ent. News, xxi, 259, 1910.
Mansonia perturbans Thibault, Proc. Ent. Soc. Wash., xii, 16, 1910.
Tæniorhynchus perturbans Theobald, Mon. Culic., v, 426, 1910.
Coquillettidia perturbans Morse, Ann. Rept. N. J. State Mus., 1909, 721, 1910.
Tæniorhynchus perturbans Edwards, The Entomol., vi, 261, 1912.

Digitized by Google

ORIGINAL DESCRIPTION OF CULEX PERTURBANS:

Fœm. *Fusca; proboscis nigra, fascia lata sordide albida; palpi nigri, basi testacei; antennæ nigræ; scutellum cinereo vittatum; pectus ferrugineum; abdomen fasciis ventreque cinereis; pedes testacei, femoribus apice nigris, tibiis nigro trifasciatis, tarsis nigris albo cinctis; alæ subcinereæ, venis testaceis.*

Brown. Proboscis black, long, slender, straight, with a broad dingy whitish band in the middle. Palpi black, testaceous at the base. Antennæ black. Scutellum with a cinereous stripe. Pectus ferruginous. Abdomen with a cinereous band on the fore border of each segment; under side cinereous. Legs testaceous; femora with black tips; tibiæ with three black bands; tarsi black, with a white band at the base of each joint. Wings grayish; veins testaceous, very thickly ciliated; plumes brown. Halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

United States.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF MANSONIA PERTURBANS:

Female.—Proboscis moderate, not enlarged apically; labellæ moderate; vestiture of broad roughened scales, at base narrowly and on apical two-fifths black, a broad pale-scaled band beyond base with a few black scales intermixed; labellæ pale; setæ small, dark, curved, somewhat more prominent on labellæ. Palpi about one-fourth as long as proboscis, stout, truncate, the small terminal joint concealed in the vestiture; with many stiff outstanding bristles, black scaled, a few pale scales intermixed. Antennæ filiform, moderate, joints of shaft subequal and rather short, rugose, blackish, densely clothed with pale cilia; tori globose, brownish, with a small group of flat white scales on inner side; hairs of whorls sparse, black. Clypeus broad, roundedly triangular, subtruncate before, nude, dark brown. Eyes bronzy brown. Occiput sordid brown, rather thickly clothed with narrow, curved, shiny pale ochraceous scales and numerous slender, upright, forked black ones, densest posteriorly and sublaterally; margin of eyes and cheeks more densely whitish scaled; bristles moderate, blackish, some pale brown ones projecting at vertex.

Prothoracic lobes small, remote, similarly colored to mesonotum, setose, and with lanceolate, shining pale scales. Mesonotum chestnut brown, clothed with small narrow, curved black scales and large, lanceolate, shining pale ochraceous ones, rather sparse, leaving the integument largely visible; dark scales predominating on the disk, divided by two longitudinal, bare, slightly impressed stripes, and in a large patch on either side above roots of wings; the pale scales form an ill-defined broad lateral margin, which widens and divides posteriorly to inclose the dark patch and forms a border about the antescutellar bare space; bristles rather numerous, dark before, pale yellowish on the disk and above roots of wings. Scutellum trilobate and clothed with narrow, curved, pale ochraceous shining scales; central lobe more prominent, a group of long pale setæ on each lobe. Postnotum elliptical, nude, dark brown. Pleuræ and coxæ pale brownish, with patches of flat, appressed whitish scales; two groups of dense pale-tipped bristles below wings.

Abdomen subcylindrical, flattened, slightly tapering towards tip, the last segment rather squarely truncate; membrane sordid brownish, clothed dorsally with bluish-black scales, and white ones at the sides forming a row of basal segmentary triangular patches; more or less distinct narrow basal whitish bands on basal segments; first segment black scaled with numerous long pale hairs; venter mostly black scaled, with a few white ones intermixed which tend to form basal transverse bands.

Wings rather broad; second marginal and second posterior cells much longer than their petioles, the petiole of the second marginal about half as long as the cell; cross-veins short, basal cross-vein more than its own length distant from anterior cross-vein; membrane hyaline, veins brownish, vestiture of very dense, rather broad, spatulate, black and sordid white scales intermixed, the black ones the more numerous; scales becoming broader and denser towards apex of wing; fringe blackish. Halteres entirely pale.

Digitized by Google

Legs moderately long, rather stout, pale testaceous; femora clothed with black and white scales intermixed and numerous stiff black bristles, apical portions entirely black scaled, a white spot at their apices, the hind femora with a white ring at outer fourth; tibiæ similarly clothed, the black scales more numerous and the white tips larger, hind tibiæ with a rather broad white band beyond middle, the part beyond black scaled; basal joint of hind tarsi black scaled, with a white spot at base and a broad white ring medianly, the outer joints of hind tarsi with basal halves white, apical halves black; fore and mid tarsi similarly marked, the banding narrower. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 5 mm.

Male.—Proboscis straight, moderate, slightly enlarged towards apex; clothed with black and white scales, white scales predominating centrally but not forming a defined band; apical third black. Palpi longer than proboscis, exceeding it by nearly the length of the last joint; with many very long, dense black hairs, chiefly on under side of end of long joint and the two terminal joints; clothed with broad appressed scales, white and black and forming broad bands; the base, a ring before the middle, and apical part of the long joint black scaled; apical halves of last two joints black scaled. Antennæ plumose; last two joints long, black, clothed with dense cilia, the others short, white, with broad brown basal rings; tori globose, brown; hairs of whorls long, dense, black with brown luster. Coloration similar to the female. Wings narrower, the stems of the fork-cells longer, the scales not as dense. Abdomen long and slender, depressed; black scaled above, with narrow, ragged dull white basal lunately produced bands, the eighth segment white scaled at sides; lateral ciliation of rather long and abundant pale-yellowish hairs. Tarsal white rings, particularly of front and middle legs, broader than in the female, the last joint on all three pairs nearly entirely white-scaled. Claws unequal on front and middle legs. Claw formula, 2.0–2.0–0.0.

Length: Body about 5.5 mm.; wing 4.5 mm.

Genitalia (plate 34, fig. 229).: Side-pieces conical, moderate, apical lobe undeveloped, basal lobe a triangular flap bearing a single very stout roundedly ended spine which lies in center of side-piece parallel to its axis; clasp-filament strongly inflated on its outer half with a short terminal articulated spine; harpes slender, columnar, recurved at tip and furnished with six spines on outer side; harpagones wanting; unci short, thick, triangularly terminated, closely approximated at base and tip; basal lobes rudimentary with a cluster of fine hairs; tip of the preceding segment with a row of eight long stout spines.

Larva, Stage IV. (see figure of the entire larva, plate 79).—Head subquadrate, much wider than long, eyes rudimentary; antennæ long and slender, a large hair-tuft beyond the middle arising from a noteh, terminal portion slender and much drawn out, one of the terminal hairs situated not far beyond the tuft; dorsal head-hairs all in multiple groups. Thorax transverse, rounded, slightly angled at hair-tufts; hairs long, some single, some in multiple tufts. Abdomen with the long lateral hairs single. Lateral comb of eighth segment of about twelve spines in a single, irregular row; hair-tuft behind the comb of three long hairs on a large tubercular plate. Air-tube about twice as long as wide, the basal part broad and strongly convex, the apical portion attenuated, anterior apical third channeled; two filamentous hairs arise from near base of attenuated portion, the anterior wall of which is thick and finely dentate, ending in terminal hooks; no pecten, a single pair of hair-tufts at basal third. Anal segment much longer than wide, ringed by a chitinous band; dorsal tuft of many long hairs, divided into a small and a large group on each side; lateral hair a small tuft; ventral brush small, but of long hairs, situated behind chitinous ring. Anal gills four, equal, slender and not as long as anal segment.

Digitized by Google

The eggs (plate 147, fig. 685) are laid in boat-shaped masses on the surface of the water in marshes containing sedges or other aquatic vegetation, the egg-boats held against the sides of plants by capillary action. The larvæ, on hatching, descend to the bottom and attach themselves by the peculiarly shaped air-tubes to the vascular roots of the aquatic vegetation in the mud. They grow slowly, completing their metamorphosis the following year. The pupæ do not come to the surface, being attached to the roots by their breathing-trumpets. The exact method of the emergence of the adults has not been observed. The adults fly from June to October, having issued at different periods during the season from larvæ developing at different times. There is, however, but a single annual generation. Hibernation occurs in the larval state. The females are rather severe biters and apparently travel considerable distances over wooded country. They will enter houses.

The larvæ in the first stage have the head more elongated than in the fully grown larva; the antennæ larger, but less elongate, the apical portion not finely drawn out, the hair-tuft represented by a single hair situated close to base. Air-tube bottle-shaped, with terminal hooks. Anal segment without the ventral brush. Lateral comb of the eighth segment of six long spines.

Owing to the peculiar method of life of the larva, it was long unknown. The first discovery of the larva was made by Mr. R. P. Currie, who obtained eggs by confining captured females over water. The eggs hatched, but in the absence of proper conditions the larvæ died in the first stage. Later the species became of economic importance in New Jersey, and the increased interest in the matter induced Mr. J. Turner Brakeley to give the matter special study. His account of the discovery of the larva and the life history has been communicated to us in a letter and is given in his own words:

"I see by the June '04 chat with you [Dr. Dyar], how really little I knew about the *perturbans,* until I actually ('07 and '08) found out. Lahaway was overhauled for *perturbans* breeding-places by ordinary methods of wriggler hunting—bottom and top dipping, etc. Lantern trips, covering the vicinity around Lahaway for several miles, gave collections. This showed dispersion. This with other facts convinced me that the *perturbans* was either a short- or long-distance migrant, and did not breed at Lahaway, any more than did the [*Aëdes*] *cantator* and *solicitans,* with which it appeared (1903, '04, '05). If memory serves, as Lahaway and vicinity was a non-breeder, the question was dropped.

"Up to 1907, the *perturbans* question was, as friend Smith puts it, simply a question of 'scientific interest'; but in 1907 it became of 'economic value.' Being good-natured, on his requesting J. T. B.'s aid, I again, in 1907, resumed action on the mysterious *perturbans* problem. Did they really breed at Lahaway? If so, where? And while they might not have bred at Lahaway in 1903 and 1904, possibly they might have done so later. Did considerable thinking and then resumed the lantern and net. A collection made in front of the house from 7:45 to 8:10 p. m. gave 186 *perturbans* in 25 minutes, indicating *abundance* and, ? do they breed at Lahaway. Pondered on the problem, using previous experience. To breed they must have water. Their arboreal day-habits demanded leafage. That is why, with other reasons, I selected the northeast corner of my Mink Island Reservoir as the most probable breeding-place, a spot I had never examined—semi-inaccessible—rough and a semi-marsh. July 24, 1907 (if memory serves) at daylight investigated the spot; searched for larvæ and found none. There were no adults a-wing. In fact no form of *perturbans,* adult or larvæ were seen. But I was sure of my old rule that as soon as the whip-poor-will will give its first evening call the adult *perturbans* would duly show up.

Digitized by Google

"At 7:25 or 7:30 of that day I was there with net and lantern. The day was rapidly fading into night. Peace, quiet, and absolute silence. Not an insect in sight. At 7:40 p. m. the whip-poor-will gave its call, and then the fun began, fast, fierce, and furious; 25 minutes gave 228 and the next 25 minutes gave 72 more, or a collection of 300 *per*[*turbans*] in 50 minutes, 7:40 p. m. on—an unbroken record, I guess. The collected results plus twelve pages of notes and reasons for spot selection were duly sent in to friend Smith. Previously, owing to press of business, and unable to come personally, he solicited permission to send his understudy to Lahaway. The man was a stranger to me, but, being good-natured, permission was granted. On receipt of 300 friend Smith sent him on, arriving at Lahaway July 31, 1907, where he was taken in as a guest. Remained two or three days, during which I taught him considerable he never knew before, about the *C*[*orethrella*] *brakeleyi* and your [*Culex*] *melanurus*. (You see, Dr., I have a little 18 by 30 inch hole where I always keep *mel.* in stock. Fact!)

"July 31, after dinner, I took the young gentleman in charge, not as a 'pond pointer' but as an educator. In the compend, copied from the account I sent in at the time, you will see how the first *perturbans* egg-boat ever found in nature was located. Curious how things happen, and luckily, too. Our argument was over *Anopheles*, and on Mr. G.'s attempt to prove he could collect *Anopheles* wrigglers from a pool that J. T. B. said no, resulted not in the collection of the *Anopheles* larvæ sought, but in the discovery and location of the first *perturbans egg-boat* in nature. One of those lucky incidents that happen now and then; the only spot on the place I can find that they breed to maturity. Of course there may be other spots, but if so they are undiscoverable by J. T. B.

"As Mr. G. has published, you have the facts of what he got here. The egg-boat collecting ended the trail, which was again lost. Friend Smith thought it best to let the search for larvæ go over until fall, to which I assented, and it was agreed that in the fall, after the Lahaway cranberry crop picking was out of the way, he should come, and the pool was to be pumped out to locate the lost trail. To save the pool from a pump-out, it occurred to me, why not try to relocate the lost trail myself? After some ponderation, concluded that the simplest line of hunting was the best; that there was no complexity about it, and, as I said at the time 'when the trail is discovered it will be so absolutely simple that we will kick ourselves for not finding it before.' As near as I now remember, I reasoned that at some period in their existence the larvæ must either come to the top of the water, or live on the bottom, and if neither, must be *in the bottom*. During picking [of the cranberry crop], having a leisure hour or so, in the last week of September, 1907, I proceeded to test my ideas. Top dipping showed no result. Bottom dipping showed no result. That left as a final '*in the bottom*.' Now the easiest way to get at '*in the bottom*' was to just pull a plant (which would give the bottom), wash it, and examine. The alleged J. T. B. luck came in, in that the first plant pulled gave results and the lost trail was discovered.

"And that is how J. T. B. hit the trail and was the first human being to see an undiscovered and advanced form of the larva of the *Culex perturbans*. Did enough of it to be sure I had hit the 'key' of the business, wrote out the J. T. B. process, and sent the 'key' to friend Smith, telling him to take it to White City, unlock the door, enter in, and take possession. And he did."

Dr. Dyar has observed the occurrence of the species at Dublin, New Hampshire. We quote his remarks as follows:

"The locality in question is a small pond, the source of a small stream. The pond has stony shores and was evidently formerly of some depth. It is now bordered with woods and has been extensively filled by leaves and mud. It is also at least half overgrown with a layer of grass, interspersed with small bushes

Digitized by Google

of *Myrica*. The grass forms a dense carpet with its thick root-stocks and dense vascular roots, through which, here and there, appear small spaces of water with pond-lily leaves. The whole layer is strong enough to support a man walking on it, though it is very springy, and if one stands still, water appears upon the surface and one sinks slowly. It was in the watery spaces among this grass carpet that the egg-boats of *Mansonia perturbans* were found, and to the roots below the larvæ are attached. It is essential for such a pond to remain in an undisturbed condition for it to make an ideal breeding place. Several other ponds were seen with similar grass coating, but in most of them the layers had been thickened by time and so densely grown up with sphagnum or even bushes of considerable size that breeding of this mosquito was no longer possible. A very large swamp has been formed by the damming of a stream to furnish power for an electric-light plant. At the upper end of this swamp a large area, many acres, of this grass occurs, forming an ideal breeding-place, but, owing to the changes in the level in the water brought about by its use in the electric-light works, the proper conditions seem to have been destroyed. In August the water was a foot below its normal level, so that all the open spaces in the grass were dry and covered by a hard crust. Oviposition at present is therefore impossible here. However, it is not impossible that in a rainy season (the present season is a dry one) this marsh might be permanently flooded and breeding conditions re-established."

North America, Canada to Florida, westward in the timbered country to British Columbia.

Sand Hill, Rideau, Canada, July 1, 1906 (J. Fletcher); Lincolnville, Maine, August, 1908 (H. G. Dyar); Center Harbor, New Hampshire, August, 1902 (H. G. Dyar); Springfield, Massachusetts, June 7, 1903 (F. Knab); Westfield, Massachusetts, July 14, 1903 (F. Knab); Rochester, New York, June 27 (W. V. Ewers); Ithaca, New York, July 14, 1891 (J. H. Comstock); Lake Maxinkuckee, Indiana (B. W. Evermann); Delair, New Jersey, July 9, 1901 (W. P. Seal); Siasconett, Massachusetts, October 31, 1900 (B. G. Wilder); Branford, Connecticut, June 4, 1904 (H. L. Viereck); Lakeland, Maryland, August 8, 1895 (F. C. Pratt); Plummer's Island, Maryland, July 15, 1903 (W. V. Warner); Jackson's Island, Maryland, July 29 (H. S. Barber); Difficult Run, Virginia, July 11, 1906 (Knab & Barber); Lake Drummond, Virginia, June 11, 1905 (H. S. Barber); Chesapeake Beach, Maryland, July 4, 1903 (A. Busck); Myrtle, Georgia, May 19, 1906 (A. A. Girault); Sugar Loaf Beach, Lake Okeechobee, Florida, March, 1906 (J. H. Egbert); Warner's Camp, north shore of Lake Okeechobee, Florida, 1906 (J. H. Egbert); Melbourne, Florida, April 4, 1901 (L. A. Peck); New Orleans, Louisiana, May 2, 1901 (H. A. Veazie); Mississippi River Quarantine Station, Louisiana (E. Souchon); Tutwiler, Mississippi, August 2, 1904 (H. S. Barber); Little Rock, Arkansas, July 11, 1904 (H. S. Barber); Scott, Pulaski County, Arkansas, September 24, 1909 (J. K. Thibault, Jr.); St. Louis, Missouri, August, 1904 (A. Busck); Ames, Iowa, June 27, 1906 (H. J. Quayle); Saxeville, Wisconsin, July 2, 1909 (B. K. Miller); Big Fork, Montana, July 25, 1903 (Edith Ricker); Aweme, Manitoba, June 30, 1906 (N. Criddle); Kaslo, British Columbia, July 2, 1903 (R. P. Currie).

Several records of *Mansonia perturbans* occurring in Cuba have crept into the literature, but they are all erroneous and founded upon a misidentification. Specimens of *Psorophora jamaicensis* from Cuba were at one time wrongly identified as this species. Also the earlier records for the United States apply

Digitized by Google

to other species. F. W. Edwards has examined the specimen from Toronto, Canada, recorded by Theobald as *Tæniorhynchus richardii*, and found it to be *Mansonia perturbans*. Giles, in the second edition of his book, redescribes Walker's type but gives as the locality Honduras. We are unable to understand this as Walker states that his specimen was from the United States and we have never seen specimens from farther south. The record of this species from Vera Cruz, Mexico (Parker, Beyer & Pothier, Yell. Fev. Inst., Bull. 13, 38, 1903) is undoubtedly based on a misidentification.

MANSONIA NIGRICANS (Coquillett) Dyar & Knab.

Tæniorhynchus nigricans Coquillett, Proc. Ent. Soc. Wash., vi, 166, 1904.
Coquillettidia nigricans Dyar, Proc. Ent. Soc. Wash., vii, 47, 1905.
Tæniorhynchus nigricans Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 24, 1906.
Aëdes nigricans Busck, Smithsonian Misc. Colls., quart. iss., iii, 64, 1908.
Mansonia nigricans Dyar & Knab, Ent. News, xxi, 264, 1910.

ORIGINAL DESCRIPTION OF TÆNIORHYNCHUS NIGRICANS:

Near *perturbans*, but smaller and darker, the first joint of the hind tarsi devoid of a median light colored band, etc. Deep black, a median band on the proboscis and the halteres yellow. Scales of palpi black, those at the apex white, appressed scales of occiput yellow, the upright ones brown. Mesonotum nearly covered with golden yellow scales, those of the abdomen black and with a lateral patch of whitish ones in the front angles of segments two to seven, venter black scaled and with a broad fascia of whitish ones on the base of each segment. Legs black scaled, femora with a stripe of yellow ones toward the base of the posterior side, a few on the front side toward the base, a ring of whitish scales at three-fourths the length of the femora, scales at extreme apices of femora and bases of tibiæ whitish, tibiæ also with a narrow streak of whitish ones extending nearly the entire length of the posterior side, a broad band of whitish ones at two-thirds their length, those at the apex also whitish, tarsi with a rather narrow band of whitish ones at the base of each joint, tarsal claws not toothed. Wings hyaline, the scales brown the lateral scales of the veins broadly lanceolate, second submarginal cell much longer than the second posterior, about four times as long as its petiole. Length 3.5 mm.

Panama. Two females collected by Dr. J. W. Ross.

Type.—No. 7943, U. S. National Museum.

DESCRIPTION OF FEMALE OF MANSONIA NIGRICANS (MALE AND LARVA UNKNOWN):

Female.—Proboscis moderate, subcylindrical, hardly widened at tip, labellæ conically tapered; vestiture black with a broad yellowish-white ring near middle; setæ minute, black, those on labellæ more prominently outstanding. Palpi short, one-fourth as long as the proboscis, black scaled with a white tip; setæ moderate, black. Antennæ with basal joints of shaft shorter than distal ones, rugose, pilose, black; second joint fusiform, pale at base, bearing a few black scales; tori subspherical, with a cup-shaped apical excavation, luteous brown, with a patch of yellowish white scales on inner side; hairs of whorls sparse, moderate, black. Clypeus rounded triangular, convex, blackish, pruinose, nude. Eyes black. Occiput brown, clothed with narrow, curved pale golden scales on the vertex, broader ones on the sides and along eye-margins shading to white; many erect forked scales on the nape, yellow on the vertex, black posteriorly and at the sides, a dark spot at the sides, produced by the absence of pale scales; setæ along margins of eyes black, some coarse reddish yellow ones projecting at vertex.

Prothoracic lobes elliptical, remote dorsally, dark brown, clothed with golden scales and black bristles. Mesonotum dark brown, blackish on the lateral depressions, clothed dorsally with rather coarse and dense, narrow, curved golden scales forming three broad longitudinal stripes separated by two narrow, bare impressed lines, ante-scutellar space blackish, surrounded by golden scales; short lines of golden scales over roots of the wing and along extreme lateral margins; some black scales on the blackish lateral areas; bristles coarse, reddish brown.

Digitized by Google

Scutellum trilobate, dark brown, clothed with narrow, curved pale-golden scales, each lobe with a group of dark bristles. Postnotum elliptical, prominent, blackish, nude. Pleuræ and coxæ brown, pleura with two blackish transverse lines, clothed with patches of elliptical white scales and rows of brown bristles.

Abdomen subcylindrical, slightly tapering posteriorly, the last segment subtruncate; dorsal vestiture blue black, with long golden bristles at ends of segments, a row of large lateral, segmental, sub-basal white patches; first segment with many pale-golden hairs on the disk; ventral vestiture black, with dull white, broad basal bands, except on the last segment.

Wings rather broad, hyaline; petiole of second marginal cell about one-third as long as its cell, that of second posterior cell shorter than its cell; basal cross-vein distant about its own length from anterior cross-vein; vein scales black, dense, broadly lanceolate or elliptical, many of them obliquely subtruncate, nearly covering the wing surface on distal and costal portion. Halteres pale, with darker knobs.

Legs moderate, the vestiture blue black, ringed with yellowish white; femora yellowish beneath on basal portion, with a white subapical ring, tip narrowly white; hind femora with a white spot on outer side of basal third; front and middle tibiæ with a large white spot at outer third and with a white line on under side, hind pair with a broad white ring, tips broadly white; tarsi with narrow white rings on each joint involving both ends of joints. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 mm.; wing 3 mm.

Life history and habits unknown.

Panama.

Panama City, April 18, 1904 (J. W. Ross); Ancon, Canal Zone (A. H. Jennings); Culebra, Canal Zone (A. H. Jennings).

The wing-scales of *Mansonia nigricans* may be said to be intermediate in character between those indicated by Theobald for his genus *Panoplites* and those by which he defined the genus *Tæniorhynchus*.

MANSONIA FASCIOLATUS (Lynch Arribálzaga) Dyar & Knab.

Tæniorhynchus fasciolatus Lynch Arribálzaga, Rev. Mus. de La Plata, ii, 150, 1891.
Culex fasciolatus Giles, Gnats or Mosq., 234, 1900.
Tæniorhynchus fasciolatus Theobald, Mon. Culic., ii, 192, 1901.
Tæniorhynchus fasciolatus Giles, Gnats or Mosq., 2 ed., 363, 1902.
Tæniorhynchus fasciolatus Goeldi, Os Mosq. no Pará, 23, 27, 1902.
Tæniorhynchus fasciolatus Neveu-Lemaire, Archiv de Parasit., vi, 616, 1902.
Tæniorhynchus fasciolatus Theobald, Mon. Culic., iii, 269, 1903.
Tæniorhynchus fasciolatus Parker, Beyer & Pothier (in part), Yell. Fever Inst., Bull. 13, 37, 1903.
Tæniorhynchus fasciolatus Lutz in Bourroul, Mosq. do Brasil, 38, 70, 1904.
Tæniorhynchus fasciolatus Giles, Journ. Trop. Med., vii, 382, 1904.
Tæniorhynchus fasciolatus Blanchard, Les Moust., 383, 1905.
Tæniorhynchus fasciolatus Goeldi, Os Mosq. no Pará, 106, 1905.
Tæniorhynchus fasciolatus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 24, 1906.
Tæniorhynchus fasciolatus Aiken, Brit. Guian. Med. Ann., 1906, 68, 1907.
Tæniorhynchus fasciolatus Theobald, Mon. Culic., iv, 483, 1907.
Tæniorhynchus fasciolatus Autran, Anal. Dep. Nac. Hig., xiv, 26, 1907.
Tæniorhynchus fasciolatus Peryassú, Os Culicid. do Brasil, 218, 1908.
Tæniorhynchus fasciolatus Busck, Smiths. Misc. Colls., quart. iss., iii, 63, 1908.
Mansonia fasciolatus Dyar & Knab, Ent. News, xxi, 264, 1910.
Tæniorhynchus fasciolatus Theobald, Mon. Culic., v, 420, 1910.
Rhynchotænia fasciolata Brèthes, Anal. Mus. Nac. Buenos Aires, Ser. 3, xiii, 470, 1911.
Pseudotaeniorhynchus fasciolatus Theobald, Novæ Culic., i, 19, 1911.

Digitized by Google

ORIGINAL DESCRIPTION OF TÆNIORHYNCHUS FASCIOLATUS:

Niger; proboscis albo-3-annulata; thorace vitta media lata testacea aurato-squamulata juxta scutellum extense ornato; alis dense fusco squamatis; femoribus ante apicem albo-annulatis; tibiis albo-argenteo-guttatis; tarsorum basi alba. Abdomine subchalybescente utrinque uniseriatim argenteo-maculato.—Long. (proboscis exclusa) 5 millim. (♀).

Antennæ nigro-fuscae, parce at longe verticillatim fusco-pilosae, articulationibus plus minusve anguste albicantibus; torulus testaceus. *Caput* nigro-fuscum, postice albido-argenteo-squamulatum, parce breviter fusco-pilosum. *Oculi* obscure viridi angustissime argenteo-marginati. *Palpi maxillares* nigro-fusci, fusco-pilosulli, apice nivei. *Proboscis* recta nigro-fusca, basi annulo obsoleto albo-notata, medium versus late albo-cingulata, apice distincte albo. *Thorax* suprâ obscure piceus, vitta media longitudinali, lata, testacea, aureo rufesco-squamulata, juxta scutellum extensa, signatus, suprâ breviter utrinque longius fusco-setosus; *scutellum* dense aureo-rufesco-squamulatum, setis destitutum videtur; *pleurae* piceae griseo-pruinosae; *sternum* testaceo-piceum, *metanotum* piceum griseo-pruinosum. Alae hyalinae at densissime nigro fusco-squamatae, cellula 2a postica 1a prope sesqui breviore. *Halteres* flavicantes. *Coxae* sub-testaceae; *trochanteres* sordidè testaceo-flavicantes, griseo-pruinosi; *femora* nigra inferné basin versus flavicantia, ante apicem annulo niveo ornata; *genua* puncto albo signata; *tibiae* nigrae, argenteo-guttulatae, apice albae; *tarsi* nigri, articulorum basi nivea. *Abdomen* suprâ nigro-chalybeum, segmentis apice lateribusque parce fusco-chalybeo-pilosis utrinque serie una e maculis rotundatis argenteo-niveis composita ornatum, subtus piceum vel piceo-chalybeum, segmentis posticè albo-marginatis.

Hab. observ.: *Navarro in* Provincia Bonaerensi.

No he visto sinó dos hembras coleccionadas por mí en el Oeste de Buenos Ayres, por Marzo de 1886. Se asemeja á *Culex fasciatus* Fabr. (*nec* WIED.) del que difiere en tener la trompa anillada de blanco puro y no toda parda, y en que sus palpos sólo tienen blanco el extremo del 4º artejo y todo el 5º y no la base de todos los artejos como ocurre en *C. fasciatus;* además, la raya dorsal del tórax es testácea con escamas dorado-rojizas en mi especie y nó blanca de nieve, los muslos con anillos blancos de plata, las tibias goteadas de plata y todos los artejos de los tarsos con la base blanca de nieve y no patas pardas con sólo los tarsos anillados de blanco como en *C. fasciatus;* finalmente el abdómen uniformemente pardo en la última especie, es negro-violáceo con una fila de manchas plateadas en cada lado de él en mi *T. fasciolatus.* Parece afine de *C. taeniatus,* WIED, por el color y manchas del abdómen, así como por el colorido de las patas, pero la raya dorsal del tórax es única, y la trompa es anillada en mi *Tæniorhynchus,* mientras que aquella es triple y ésta es "*braun ohne Binden*" en el *Culex* con que lo comparo. Por razones análogas se aparta de los *C. exagitans* WALK. y *C. toxorhynchus* MACQT. Indudable relacion tiene con el *Tæniorhynchus tæniorhynchus* (WIED.) F. LYNCH A., pero es muy diverso en lo referente al color del tórax y abdómen, así como tambien por el número de anillos que ciñen su trompa. Por Noviembre de 1887 capturé un macho de *Tæniorhynchus* con palpos larguísimos y muy plumosos, pero no había alcanzado aún todo su desarrollo y murió antes de la madurez, de manera que no me fué posible comprobar si pertenecía á esta especie ó á otra afine, aunque sí tengo la certidumbre de que no corresponde á la de WIEDEMANN. A diferencia del *T. tæniorhynchus,* sus escamas alares son alargadas y claviformes como en *Psorophora* y en la especie anterior.

DESCRIPTION OF FEMALE OF MANSONIA FASCIOLATUS (MALE AND LARVA UNKNOWN):

Female.—Proboscis rather long, uniform, with labellæ triangularly pointed, clothed with rather narrow, appressed black scales and white ones forming a rather narrow ring in the center, and a still narrower one at base of labellæ; setæ rather numerous, short and curved, dark. Palpi about one-fifth the length of the proboscis, clothed with black scales and white ones at tip, a number of long black setæ. Antennæ with the tori globose, yellowish brown with a few minute setæ within, the succeeding joints subequal, second joint with pale base and a few black scales, the rest shining black, clothed with black cilia; hairs of whorls sparse, moderate. Clypeus rounded, convex, nude, dark brown. Eyes bronzy blackish. Occiput dark brown, clothed with narrow, curved golden-ochraceous scales, which are most dense along margins of eyes, many upright, forked brown scales with golden-ochraceous luster dorsally, densest on the nape; a few long, curved black bristles along margins of eyes, some reddish brown ones projecting at vertex.

Digitized by Google

Prothoracic lobes dark brown, remote, with pale-golden scales on upper side and a few black bristles. Mesonotum bright brown, nearly bare in places, clothed with narrow, curved pale-golden and small bronzy brown scales in patches, dorsally two narrow, bare impressed lines, at sides of ante-scutellar space a broad, bare, bright brown patch, ante-scutellar space and lighter brown; anteriorly a median stripe of golden scales which spreads into the lateral dark area before the middle, ante-scutellar area surrounded by pale-golden scales, a short line of golden scales before the roots of the wings, extreme lateral margin golden scaled; rather numerous long, bright brown bristles with blackish tips. Scutellum distinctly trilobate, with narrow pale golden scales, each lobe with long brown bristles. Postnotum elliptical, prominent, brown, nude, slightly pruinose. Pleuræ and coxæ pale brown mottled with blackish, clothed with groups of dark bristles, some patches of white, flat appressed scales in the middle of the pleuræ.

Abdomen subcylindrical, somewhat flattened dorsally, the tip rather squarely truncate; dark brown, clothed above with blue-black scales and with a row of golden bristles at tip of each segment which are most numerous on last segment; a series of large roughly triangular, lateral patches of pure white scales at bases of segments; venter clothed with black and yellowish scales intermixed, the black predominating, the yellowish scales forming irregular, narrow basal bands.

Wings hyaline, rather broad, veins slightly brownish; petiole of second marginal cell considerably shorter than the cell; that of second posterior cell also shorter than its cell; basal cross-vein more than its own length distant from anterior cross-vein; vestiture of dense, narrowly ovate and broader obliquely truncate scales, dull brown, a few creamy white ones at bases of costa and first vein, some pale scales at bases of fork-cells and at cross-veins; fringe black. Halteres white.

Legs slender, rather long, clothed with black scales; femora irregularly pale-yellow scaled below near base and with a series of white spots, a narrow white ring before tip and a white apex; tibiæ black, with series of irregular yellowish-white spots, tips white, the hind pair with a long white mark on under side beyond middle; hind tarsal joints with narrow shining-white rings which involve both ends of joints, the last joint white at base only; fore and mid tarsi white ringed at base and apex of first two joints and at base of third, terminal joints entirely dark scaled. Claw formula, 0.0–0.0–0.0.

Length: Body about 5 mm.; wing 4 mm.

Dr. Goeldi makes the following observations on the life history and habits:

Females were captured and deposited eggs. About one in seven specimens captured laid eggs. The eggs are deposited in ribbon-shaped masses, consisting of a double row about 60 eggs long, the eggs placed upright as in the egg-rafts of *Culex*. The masses are slightly curved toward the upper side. The females all died soon after ovipositing. The larvæ hatched in about five days. The single eggs measure 0.68 mm. in length and 0.14 mm. in width. The shape is cylindrical, most pointed at the upper end. The larvæ hatch from the lower end, the end being detached in the form of a circular lid. The egg is covered with relatively large transparent granules. The color is dark brown. The larva in the first stage is like that of *Mansonia perturbans*, with very long antennæ, the tip greatly drawn out, causing the apical spines to be much separated, the hair towards the base; lateral comb of the eighth segment of few spines in a single row; air tube bottle-shaped, the outer half very slender and furnished with a crown of spines at the tip. Dr. Goeldi was unable to feed the larvæ; undoubtedly they live at the bottom of swamps, attached to the vascular roots of aquatic vegetation, in the manner of *Mansonia perturbans* and *M. titillans*. The imagines

Digitized by Google

are crepuscular in habit. The female is said to be very blood-thirsty and to enter houses. Its bite is reported painful.

Tropical America, from southern Mexico to Argentina, Island of Trinidad, but not the Antilles proper.

Polochic River, Guatemala, March 22, April 19, 1906 (Schwarz & Barber); Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 19, 1906 (Schwarz & Barber); Bluefields, Nicaragua (W. F. Thornton); Colon, Panama, May 21, 1904 (A. C. H. Russell); Bocas del Toro, Panama (McKenny); Panama City, Panama, April 18, 1904 (J. W. Ross); Caldera Island, Porto Bello Bay, Panama, February 16, 1909 (A. H. Jennings); Gatun, Canal Zone, Panama (A. H. Jennings); Pequini River, Panama (A. H. Jennings); Trinidad, British West Indies, June, 1905 (A. Busck); Schepmoed, British Guiana, January 29, 1906 (E. D. Rowland); Berbice, British Guiana, March, 1907 (J. Aiken); Stanley Town, British Guiana, September 13, 1905 (E. D. Rowland); Rupununi, British Guiana (K. S. Wise); São Paulo, Brazil (A. Lutz).

Also reported from Vera Cruz, Mexico (Parker, Beyer & Pothier); Cedros, Trinidad (Theobald); city of Rio de Janeiro; State of Amazonas; cities of Pará, Obidos, Prainha, Arroyollos, Oyapoc and Amapá, all in the State of Pará; States of Pernambuco and Bahia; cities of Juiz de Fóra, Oliveira, Cysneiros, Tartaria, Lavras and Barbacena, shores of the river Velhas, all in the State of Minas Geraes; city of Santos and in the valley of the Parahyba, State of São Paulo; Ladario, State of Matto Grosso, Brazil (Peryassú); Navarro, Province of Buenos Ayres, Argentina (Arribálzaga).

MANSONIA COTICULA (Dyar & Knab) Dyar & Knab.

Tæniorhynchus coticula Dyar & Knab, Journ. N. Y. Ent. Soc., xv, 101, 1907.
Tæniorhynchus coticula Busck, Smiths. Misc. Colls., quart. iss., iii, 62, 1908.
Mansonia coticula Dyar & Knab, Ent. News, xxi, 264, 1910.
Tæniorhynchus corticula Theobald, Mon. Culic., v, 618, 1910.

ORIGINAL DESCRIPTION OF TÆNIORHYNCHUS COTICULA:

Proboscis brown, blackish outwardly, a white ring in the middle, the tip also white; palpi black, whitish at the end; thorax light brown, the impressed lines pale, the ridges dark, forming a series of narrow dark lines; abdomen black above with a slight bluish luster, unbanded, below with a sublateral row of small segmentary silvery spots; legs black, the hind femur with a spot at outer third and tip of bluish silvery white, the hind tarsal joints broadly white ringed at the base, the last joint all white.

Two ♀♀, Bocas del Toro, Panama, Sept. 25, 1903 (P. Osterhaut).
Type.—Cat. No. 10281, U. S. Nat. Mus.

DESCRIPTION OF FEMALE OF MANSONIA COTICULA (MALE AND LARVA UNKNOWN):

Female.—Proboscis uniform, rather long, labellæ conically tapered; clothed with black scales, a narrow ring of white ones near middle and a still smaller one at base of labellæ. Palpi about one-fifth as long as proboscis, rather straight, black, tips broadly silvery white; a number of long black bristles, longest towards base. Antennæ with tori globose, yellowish brown; succeeding segments subequal, blackish, sparsely ciliate, the whorls with rather few long black hairs. Clypeus broad, rounded, subtruncate, nude, dark brown. Eyes black. Occiput brown, clothed with narrow, curved blackish scales, a small tuft at vertex and margins of eyes narrowly silver-scaled; numerous long, erect, forked black scales on the vertex and a few long bristles bordering the eyes.

Prothoracic lobes moderate, well separated, brown, with some silvery scales and a few black bristles. Mesonotum ferruginous brown, with two somewhat impressed bare lines and a large, elongate bare space above base of wings, leaving three darker longitudinal dorsal stripes which are sparsely clothed with small, narrow, curved, deep bronzy-brown scales, a very small patch of narrow,

Digitized by Google

curved, shining, silvery scales on lateral area of disk midway between prothoracic lobe and root of wing; bristles coarse and black, denser before wing insertion; lateral margins with small, narrow, curved black scales and a similar vestiture surrounding ante-scutellar bare space. Scutellum trilobate, each lobe with a group of black bristles, mid lobe basally with curved silver scales and black ones distally. Postnotum nude, dull luteous, blackish at base. Pleurae and coxae yellowish brown, with small patches of silver scales and a few black bristles.

Abdomen subcylindrical, depressed, terminal segments slightly tapering, the last rather sharply truncate and with many coarse hairs; dorsal vestiture of blue-black scales; on sides a row of basal segmentary triangular patches of brilliantly bluish-white silvery scales; first segment with a patch of black scales and numerous yellowish hairs; venter mostly dark scaled, with a number of rather coarse yellowish bristles and a few silvery-white scales which tend to form basal bands, especially centrally.

Wings moderate, slightly smoky, veins very slightly darker; petiole of second marginal cell about half the length of that cell, that of second posterior cell nearly equal in length to the cell; basal cross-vein more than its own length distant from anterior cross-vein; vestiture of dense, obsoletely truncate, elongate-ovate and broadly lanceolate, blackish-brown scales; fringe of same color; a minute silver spot near base of first vein. Halteres with basal part of stems pale, knobs black, with a patch of silvery-white scales on one angle.

Legs slender and rather long, black scaled; femora pale-yellow scaled beneath, with small white tips; mid and hind pair with a small silver spot at outer third; fore pair with a pale ring at outer third; tibiae more narrowly pale beneath, with a silver tip on upper side; hind tarsi with white bands involving both ends of joints, basal portions of bands on hind tarsi broad, the last tarsal joint entirely white on upper side; front and middle tarsi with first two joints narrowly white-ringed at their bases, the succeeding joints entirely black scaled. Claws small. Claw formula, 0.0–0.0–0.0.

Length: Body about 4.5 mm.; wing 3.75 mm.

Life history and habits unknown.

Panama.

Bocas del Toro, September 25, 1903 (P. Osterhout).

The lateral spots of abdomen have their apices resting on the bases of the segments, the broadest part distally.

MANSONIA TITILLANS (Walker) Blanchard.

Culex titillans Walker, Cat. Brit. Mus., Dipt., i, 5, 1848.
Taeniorhynchus taeniorhynchus Lynch Arribálzaga (not *Culex taeniorhynchus* Wiedemann), Rev. Mus. de La Plata, ii, 148, 1891.
Culex titillans Giles, Gnats or Mosq., 233, 1900.
Culex taeniorhynchus Giles (in part, not Wiedemann), Gnats or Mosq., 245, 1900.
Panoplites titillans Theobald, Mon. Culic., ii, 175, 1901.
Panoplites titillans Giles, Gnats or Mosq., 2 ed., 352, 1902.
Mansonia titillans Neveu-Lemaire, Archiv de Parasitol., vi, 20, 1902.
Mansonia titillans Theobald, Mon. Culic., iii, 273, 1903.
Panoplites pseudotitillans Parker, Beyer & Pothier (not Theobald), Yell. Fever Inst., Bull. 13, 37, 1903.
Mansonia titillans Lutz in Bourroul, Mosq. do Brasil, 69, 1904.
Mansonia titillans Pazos, Bull. Soc. Ent. France, 1904, 135, 1904.
Mansonia titillans Blanchard, Les Moustiques, 377, 1905.
Mansonia titillans Theobald & Grabham, The Mosq. or Culic. of Jamaica, 33, 1905.
Taeniorhynchus titillans Dyar, Proc. Ent. Soc. Wash., vii, 47, 1905.
Mansonia titillans Goeldi, Os Mosq. no Pará, 114, 1905.
Mansonia titillans Felt, Bull. 97, N. Y. State Mus., 462, 1905.
Mansonia titillans Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. No. 11, 25, 1906.

Digitized by Google

Mansonia tittilans Aiken, Brit. Guiana Med Ann., 1906, 68, 1907.
Mansonia titillans Theobald (in part), Mon Culicid., iv, 494, 1907.
Mansonia titillans Autran, Anal Dep. Nac. Hig., xiv, 24, 1907.
Mansonia titillans Dyar & Knab, Can. Ent., xl, 312, 1908.
Mansonia titillans Peryassú, Os Culicid. do Brazil, 49, 231, 1908.
Mansonia titillans Busck, Smiths. Misc. Colls., quart. iss., lii, 60, 1908.
Mansonia titillans Pazos, San. y Ben., ii, 48, 427, 1909.
Mansonia titillans Moore, The Daily Argosy, Demerara, Jan. 27, 1910, and Feb. 3, 1910.
Mansonia titillans Dyar & Knab, Ent. News, xxi, 259, 1910.
Mansonia titillans Newstead & Thomas, Ann. Trop. Med. Par., iv, 144, 1910.
Mansonia titillans Theobald, Mon. Culic., v, 448, 1910.

ORIGINAL DESCRIPTION OF CULEX TITILLANS:

Fem. *Fuscus, abdominis segmentis utrinque albo maculatis, antennarum articulis albo cinctis, rostro flavo cincto, femoribus basi genubusque pallidis, tarsis albo cinctis, alis subfuscis.*

Body dark brown: feelers black; each joint white at the base: mouth black, with a dull yellow band across it: abdomen with a white spot on each side of the fore border of every segment: legs brown; thighs paler towards the base; knees yellow; feet with a white band at the base of each joint: wings slightly brown; veins brown; poisers yellow, with brown knobs. Length of the body 2 lines; of the wings 4 lines.

a. Brazil. Presented by Mrs. J. P. G. Smith.

DESCRIPTION OF FEMALE, MALE, AND LARVA OF MANSONIA TITILLANS:

Female.—Proboscis rather short, nearly uniform, labellæ large; vestiture of black semi-erect scales with yellow ones intermixed on basal half, a narrow white ring beyond the middle. Palpi about two-fifths the length of the proboscis; vestiture of black semi-erect scales with whitish ones intermixed, apices silvery scaled. Antennæ filiform, the segments rather short and stout, rugose, blackish, with white basal rings; hairs of whorls sparse, rather short; tori small, brown, with a few whitish scales. Clypeus large and prominent, broadly rounded in front, brown, naked. Occiput with narrow, recumbent yellowish and whitish scales and a dense mass of black, erect, forked scales covering entire dorsal surface; ocular margin and sides of head white scaled.

Prothoracic lobes well separated, prominent, contiguous with the head, bearing numerous black setæ and light colored scales. Mesonotum rich chestnut brown, sparsely clothed with minute, narrow, curved, deep brown and larger golden scales intermixed; two submedian longitudinal, rather closely approximated bare stripes from anterior margin nearly to bare space; setæ abundant but rather short, deep brown. Scutellum covered with golden scales and with three groups of long, coarse brown setæ. Postnotum brown, with a faint median ridge, nude. Pleuræ and coxæ brown, clothed with patches of small sordid white scales.

Abdomen subcylindrical, somewhat depressed, slightly expanded and truncate at apex; vestiture above of dusky scales with numerous dull yellow ones intermixed, particularly at sides and on last two segments; laterally the hind margins of the segments are white scaled; first segment with the yellowish scales predominating and with numerous long yellowish cilia; beneath the vestiture is of dusky scales intermixed centrally with many whitish ones, at the sides with yellow ones, the hind margins white scaled; eighth segment with a row of closely set, small, stout hooks along dorsal posterior margin; lateral cilia and those of hind margins of segments abundant, rather long, brown.

Wings rather broad, slightly smoky; second marginal cell very long, more than twice as long as its petiole; base of second posterior cell in line with base of second marginal cell; basal cross-vein slightly more than its own length from anterior cross-vein; scales along the veins blackish, with numerous yellow ones irregularly intermixed, in two series, the upper ones large, very broad, obliquely

Digitized by Google

subtruncate, covering the lower ones, which are lanceolate; fringe dusky. Halteres with the knobs dark scaled.

Legs dusky scaled with a sprinkling of yellowish scales; femora and tibiæ with numerous scattered yellowish scales and without pale rings or apical spots; tarsi of front and middle legs dorsally white marked at bases of second, third, and fourth segments; hind tarsi with all but first segment basally white-ringed, the rings narrowed beneath. Claw formula, 0.0–0.0–0.0.

Length: Body about 3.5 to 5 mm.; wing 3 to 4.5 mm.

Male.—Proboscis moderately long, straight, slightly swollen apically; vestiture of brown scales with yellow ones intermixed, without pale ring. Palpi very long, exceeding the proboscis by more than the length of the last joint; long joint about three-fourths the length of proboscis, slender, the apical third dilated; last two segments stout, the last slightly longer, blunt at tip; vestiture of dusky scales with yellow ones intermixed, the constriction below middle of long joint pale, bases of last two joints narrowly silver scaled; apex of long joint and last two joints with a dense mass of very long brown hairs. Antennæ densely plumose; last two joints long, slender, rugose, pilose, brown, the others short, pale, with dark rings at insertions of hair-whorls; hairs of whorls long, brown with yellowish silky luster; tori large, deep brown, with whitish scales. Clypeus large and prominent. Occiput with yellowish, narrow recumbent scales and numerous black, erect, forked ones; sides of head white scaled. Coloration similar to the female. Abdomen long, depressed towards apex, nearly straight sided; lateral ciliation coarse, abundant, long, dark brown. Wings rather narrow, vestiture sparser than in the female; second marginal cell considerably longer than its petiole; base of second posterior cell nearer the base of the wing than the second marginal cell; basal cross-vein more than its own length from anterior cross-vein. Knobs of halteres dark, with dusky scales. Claw formula, 2.0–2.0–0.0.

Length: Body about 4.5 mm.; wing 3.5 mm.

Genitalia (plate 34, fig. 228): Side-pieces about three times as long as wide, narrowed a little at middle, without lobes; clasp-filament very stout tapering to tip, a slender branch at basal fourth, a short, stout, inserted terminal spine. Harpes elliptical, with strongly revolute inner margins, tips bent over and serrated. Basal lobe of side-piece represented by a long rounded process, attenuated centrally, lying upon the side-piece and reaching well toward its tip, bearing two inserted terminal stout spines. Unci forming a short basal cylinder.

Larva, Stage IV (plate 128, fig. 446).—Head flat, quadrate, transverse; the eyes on a rounded, slight prominence near the posterior angles; anterior division of eye narrow, transverse, curving around from upper to under surface; posterior division small, rounded, covered by a curved stout transparent spine; front of head partly rounded, prominent; clypeus emarginate, with a stout articulated spine on each side of the emargination; a tuft of fine radiating hairs arises beneath the middle; a large hair-tuft near base of antenna, the other head-hairs rudimentary. Antennæ large, broadly inserted, a broad, stout tooth beneath the insertion; shaft long, nearly uniform from base to terminal process, with a long tuft of hairs near the middle of that portion; half of the terminal region is produced as a long slender rod, as long as the rest of the antenna and doubling its length, which thus considerably exceeds the width of the head; two small processes are borne on the tip of the rod, the other two are long hairs. Mouth-brushes long, fine, moderate. Mental plate small. Thorax and abdomen normal, the abdominal segments uniform; hairs small, the long lateral ones single; each segment has a small dorsal chitinization and a broad ventral band weakly chitinized, extending each side in a rounded point covering the origin of the sub-

Digitized by Google

dorsal hair, the band expanding ventrally to half the width of the segment. Lateral comb of eighth segment of five slender widely separated teeth. Eighth segment elevated dorsally to the air-tube, which is short, conical, the apical portion attenuated, bearing a tuft of four hairs on each side near the middle and a pair of filaments at base of apical projection; this consists of two thick lamellæ with a group of hooks at the tip and two or three stout teeth on the anterior aspect mesially. Anal segment long and slender, four times as long as wide, ringed by a chitinous band; ventral brush small, nearly terminal and preceded by a row of small tufts to middle of segment; dorsal tuft of a long hair and large tuft on each side. Anal processes four, equal, slender, small, somewhat longer than the width of the last segment.

Pupa.—Thoracic mass subpyriform, smooth; no dorsal tuft. Abdominal segments strongly prominent on the posterior margin, with a pair of thick spine-like hairs. Anal paddles elliptical, narrow, with notched tip. Respiratory tubes slender, slightly expanding, the orifice large with a flap on the outer side half as long as the tube, with lateral membrane on each side not quite reaching tip.

Mr. H. W. B. Moore has published the following observations on the life history, made in British Guiana:

"*Mansonia titillans* is one of the commonest mosquitoes of tropical South America, abounding especially in coast regions and along the banks of rivers. It is present with us throughout the year in greater or less numbers. Even in the height of the dry season it is here to annoy us. The larva has remained unknown. I had been hunting for it, and had searched to no purpose swamps, trenches and water-holes at morning, noon and evening. I also had tried over a dozen times to get the larvæ from eggs by allowing the mosquitoes to suck my blood and then enclosing them in jars. In no instance did even one so much as deposit eggs. Now it happened that I was dipping with a calabash in one of the Kitty sweet-water canals for larvæ of two other mosquitoes, which can always be found there. The water was pretty thickly coated with the aquatic plants Salvinia and Pistia. One of my dippings brought up a portion of Pistia, which I threw back. After pouring out most of the water I noticed a large, stout whitish brown larva wriggling at the bottom of the calabash among the thick rust-brown stuff dislodged from the roots of the plant. At first sight I thought it was a dragon-fly larva, but, its actions making me suspicious, I turned it into my collecting tin for further examination. On arriving at the Museum a cursory examination showed it was a mosquito larva new to me, and the biggest I had as yet come across. Next afternoon I returned to the same trench and soon discovered that by taking up Pistia and shaking the roots vigorously in water in my calabash that I could get in a short time quite a number of these big brown larvæ. Last week the adult mosquito began coming out, and it is *Mansonia titillans*."

The siphon of the larva "is characteristic, being short, conical, tapering to a point, black at the apex, and almost in a straight line with the length of the body. Its resting position is also characteristic, it hangs vertical, it likes to suspend itself among the roots of the green rosette-like plant Pistia and its general rusty brown colour harmonizes well with the colour of the muck about the roots. In lifting the plant from the water the larvæ come up with it entangled in its roots. The pupa has peculiar long siphons, that curve forwards and then outwards, and end in a point."

Dyar and Knab commented on Mr. Moore's discovery as follows:

"Mr. Moore has been kind enough to send us preserved larvæ and pupæ. It is clear from their structure that both the larva and pupa are attached to the roots of the Pistia from which they get their air. The apical portion of the breathing tube of the larva of *Mansonia titillans* is shorter and stouter than in

Digitized by Google

M. perturbans, but essentially the same in character. This portion of the tube is a modification of the closing apparatus of the ordinary Culicid type of tube; it is provided, however, with serrations for piercing the tissues of the plant and with terminal hooks for retaining its hold. The pupæ also greatly resemble those of *perturbans*. As in that species, the stellate hair-tuft of the first abdominal segment, which in floating pupæ serves to lock them to the surface film, is here obsolete, while the anal paddles are narrow and cleft at the apex. The breathing tubes are long and in their terminal portion are each provided with a long strongly chitinized hook for insertion into the roots of the water-plant."

This mosquito is very troublesome in localities that furnish suitable breeding conditions. Its bite is said to be unusually painful and Dr. Grabham states that "its saliva is distinctly acid." He has observed this mosquito attacking horses. Mr. E. A. Schwarz took specimens in the house, in Cuba, in the middle of the day. Mr. Argyle McLachlan gives us the note "brown specimens with green eyes, assume the position with abdomen lower than thorax, the tip of the abdomen almost touching the surface on which the mosquito rests." Dr. Goeldi has figured this posture and states that on account of this peculiar posture this mosquito is not easily seen when at rest. Goeldi states further that *Mansonia titillans* is crepuscular and in the outskirts of Pará frequently enters houses at nightfall, along with *M. fasciolatus* which practically has identical habits. Like other crepuscular mosquitoes, it will attack in the shade of the forest during the day. Pazos states that *titillans* is very blood-thirsty and when attacking does not easily let go and will almost allow itself to be seized with the hand. His attempts to obtain eggs from captive females failed.

In spite of the very wide distribution indicated below, this mosquito is local, and occurs only in localities which furnish the proper larval habitat. In other words, it occurs only where there are swamps and permanent bodies of water in which the floating plant *Pistia* (and perhaps others of similar habit) grows, and to which the larvæ are attached. It is therefore most in evidence in moist regions and, where found, is one of the most annoying mosquitoes by its persistence and painful bite.

South America, except the extreme southern part and the west coast below Ecuador; Central America to tropical Mexico; the West Indies and southern Florida.

São Paulo, Brazil (A. Lutz); River Corentyne, Dutch Guiana, July 1, 1908 (J. Aiken); Surinam, Dutch Guiana (H. Polak); New Amsterdam, British Guiana, May, 1907 (J. Aiken); Georgetown, British Guiana (H. W. B. Moore); Berbice, British Guiana (J. Aiken); Trinidad, West Indies, June, 1905 (A. Busck); Kingston, Jamaica, November 16, 1906 (M. Grabham); Cayamas, Cuba, February 24 to June 11 (E. A. Schwarz); San Antonia de los Baños, Cuba (J. H. Pazos); Lion Hill, Canal Zone, Panama (A. Busck); Punta de Peña, Panama, 1907 (R. E. B. McKenny); Bluefields, Nicaragua (W. F. Thornton); Panzos, Guatemala, June, 1904 (O. F. Cook); Puerto Barrios, Guatemala, August 18, 1903 (W. L. Stone); Polochic River, Guatemala, March 22, May 1, 1906 (Schwarz & Barber); Polochic River, Guatemala, June 2, 1907 (A. McLachlan); Cacao, Trece Aguas, Alta Vera Paz, Guatemala, April 8 to 20, 1906 (Schwarz & Barber); Point Patuca, Honduras, April 11, 1909 (W. H. Sligh); Frontera, Tabasco, Mexico, February 15 (C. H. T. Townsend); La Oaxaqueña near Santa Lucrecia, State of Vera Cruz, Mexico, October, 1911 (F. W. Urich); Las Peñas, near Tepic, State of Jalisco, Mexico, June, 1906 (A. Dugès); Palizada, Mexico (A. Dugès); Nautla, Mexico (A. Dugès); Tampico, Mexico (J. Goldberger); Warner's Camp, north Shore of Lake Okeechobee, Florida, March, 1906 (J. H. Egbert). Also reported from Vera Cruz, Mexico (Parker, Beyer & Pothier); Rio de Janeiro, Brazil; New Amsterdam, British Guiana; Welldad, British Guiana; Cedros, Trinidad, British West Indies; Antigua; Jamaica

Digitized by Google

(Theobald); Pará, Brazil (Goeldi); Yquitos, Peru (Newstead and Thomas); Argentine Republic (Arribálzaga).

Dyar and Knab have published the following (Can. Ent., xl, 312, 1908):

"We regret to be obliged to call attention to an important error in the otherwise excellent work of Dr. Goeldi. That author figures the eggs of *Mansonia titillans* from photographs. This constitutes the only reference published to the life-history of this interesting species, and is the only contribution to the life-history of it or its allies. Dr. Goeldi's observations have been widely quoted, and it is generally supposed, in consequence, that *Mansonia* eggs are of fusiform shape and deposited singly. It is, however, clearly to be seen from the figures of the adult on Dr. Goeldi's plate, that the species he had under observation could not have been a *Mansonia*, owing to the long tapering extensile abdomen there clearly shown, characteristic of *Ædes* (*sensu nostrum*), while the abdomen of *Mansonia titillans* is blunt and non-extensile. This type of egg is also characteristic of *Ædes*, and leaves the early history of *Mansonia* entirely unknown." The larva and pupa are now known, but Mr. Moore's observation on the egg-laying habits have reached us too late for inclusion here. We think that probably the series of heavy chitinous hooks on the eighth abdominal segment of the female may be employed in this connection.

Newstead and Thomas state that this *Mansonia* bred in the collections of water formed in the cellars of houses situated along the low-lying land next the river, which were flooded at high water, and that the larvæ were not found where the water had been oiled. We believe this to be an error, as the *Pistia* plants would not occur in the cellars of houses. No doubt these authors concluded that the *Mansonia* bred in temporary pools like some other mosquitoes. Finding the *Mansonia* abundant and larvæ in the pools abundant, they assumed that there was a connection between the two facts.

We suspect that *Mansonia pseudotitillans* Theobald (Mon. Culic., ii, 178, 1901), from the lower Amazon, should be placed as a synonym of *titillans*. The only tangible difference indicated is that *pseudotitillans* is said to have only broad scales on the wing-veins, while *titillans*, and all the other *Mansonia*, have two series of wing-scales, broad and narrow. We note that in perfect specimens of *titillans* the narrow scales are completely hidden by the superimposed broad scales, and we think that Theobald may have had such specimens before him. The fact that no new specimens of *pseudotitillans* have been reported strengthens this view. However, comparison of the types can alone decide this question.

MANSONIA FLAVEOLUS (Coquillett) Dyar & Knab.

Tæniorhynchus flaveolus Coquillett, Proc. Ent. Soc. Wash., vii, 182, 1906.
Tæniorhynchus flaveolus Coquillett, U. S. Dept. Agr., Bur. Ent., Tech. Ser. 11, 24, 1906.
Mansonia flaveolus Dyar & Knab, Ent. News, xxi, 264, 1910.
Tæniorhynchus (?) *flaveolus* Theobald, Mon. Culic., v, 432, 1910.

ORIGINAL DESCRIPTION OF TÆNIORHYNCHUS FLAVEOLUS:

Scales of proboscis yellow and with several black ones intermixed, those of the palpi mixed yellow and black, with a band of white ones at the sutures of the joints; palpi slightly widening at the apex; appressed scales of the occiput light yellow, the numerous upright ones brown. Body yellowish, scales of mesonotum and scutellum light yellow, the hairs black, scales of abdomen golden yellow, a few black ones on the first three and the last segment. Scales of legs mixed yellow and black, not forming distinct spots or bands, those on the apices of the joints of the middle and hind tarsi wholly black, on the broad bases of the last four joints white; claws of front and middle tarsi with a tooth under one of the claws, none under the other, hind tarsal

Digitized by Google

claws simple. Wings hyaline, the scales oval, mixed black and yellow, not forming distinct spots. Length nearly 5 mm.

St. Thomas, W. I. A male specimen collected by Mr. A. Busck.

Type.—No. 8288, U. S. National Museum.

DESCRIPTION OF MALE OF MANSONIA FLAVEOLUS (FEMALE AND LARVA UNKNOWN):

Male.—Proboscis moderately long, straight, thickened apically, clothed with yellow scales with a few black ones intermixed, particularly at base and apex, an indistinct pale ring beyond the middle; labellæ silver scaled. Palpi very long, considerably exceeding the proboscis; long joint nearly three-fifths the length of entire palpi, slender, somewhat thickened apically; last two segments stouter, subcylindrical, together about three-fourths the length of long joint; last joint somewhat longer than penultimate; last two joints and apex of long joint bearing numerous very long yellow shining hairs; vestiture of palpi of yellow scales with numerous black ones intermixed; bases and apices of last two joints narrowly ringed with silver-white scales, a broad ring of white scales before middle of long joint. Antennæ plumose; hairs of whorls very long, yellowish brown; whorl-bearing segments very short, white, with yellow rings at insertions of hair-whorls, last two segments long, the penultimate the longer; tori large, luteous. Clypeus luteous-brown. Occiput clothed with shining, yellowish-white, narrow, curved, recumbent and suberect scales and with many long, erect, brown, forked scales scattered over its surface and extending down the sides; ocular margin densely yellowish-white scaled.

Prothoracic lobes widely separated, large and prominent, clothed with yellowish-white scales and with many dark bristles. Mesonotum bright chestnut brown, two lighter colored, broad, submedian, longitudinal, rather closely approximated bare stripes from anterior margin nearly to ante-scutellar space, a broad, light colored bare stripe on each side of ante-scutellar space, extending well forward, ante-scutellar bare space pale; vestiture of sparse, rather large, narrow, curved, pale golden scales; setæ of mesonotum abundant but rather short, brown, those on the posterior portion long, very dense over roots of wings. Scutellum clothed with pale-yellow scales and with three groups of coarse long setæ. Postnotum yellow-brown, nude, with faint indication of a median ridge. Pleuræ and coxæ pale yellow-brown, with patches of whitish scales and a few dusky ones.

Abdomen very slender basally, second, third, and fourth segments narrow, subcylindrical, with a median longitudinal ridge, third segment the narrowest; fifth, sixth, and seventh segments much depressed and expanded, the eighth narrower; vestiture mostly of deep yellow shining scales; first segment yellow scaled with dusky scales along middle line and with many long deep yellow cilia scattered over the surface; second segment with a sprinkling of black scales across middle; third segment densely black scaled basally and along the sides while the middle and posterior portions are entirely yellow scaled; fourth, fifth, sixth, and seventh segments entirely yellow scaled above; eighth segment with irregular patches and single black scales; claspers yellowish, with scattered, erect dark-brown scales; lateral cilia and a dorsal marginal series of erect cilia very long, brown; beneath the abdomen is yellow scaled, with scattered black scales at sides and particularly at bases of sixth and seventh segments, the eighth segment with many black scales scattered over its surface.

Wings rather narrow, hyaline; scales of two colors, dusky and light yellow, the colors showing a tendency to group in patches but forming no definite pattern; a long black patch at base of third vein; on the costa the dusky scales predominate, leaving only a few patches of yellow scales; second marginal cell long and narrow, considerably longer than its petiole; base of second posterior cell nearer base of wing than the second marginal cell; basal cross-vein slightly

Digitized by Google

more than its own length before anterior cross-vein; scales of wing veins in two series, lanceolate ones, overlaid by very broad, obliquely subtruncate and subovate ones; fringe unicolorous, pale brownish.

Legs clothed with ochreous yellow scales and many dusky ones intermixed; apices of first tarsal segments mostly dark scaled, on front and middle tarsi the segments are mostly dusky scaled above; on the middle pair the second segment is broadly ringed with whitish at base, the third and fourth segments more narrowly so; on the hind pair the second, third, and fourth segments are very broadly ringed with whitish at bases, the fifth narrowly so. Claw formula, 2.0–2.0–0.0.

Length: Body about 5.5 mm.; wing 4.5 mm.

Genitalia (plate 34, fig. 227): Side-pieces over twice as long as wide, conical, slightly constricted near middle, without lobes. Clasp-filament very stout and thick, tapering to tip, a wing-shaped branch on inner side, serrate outwardly, rounded at tip; a short, stout, terminal articulated spine at tip of filament. Basal lobe represented by a long, stout smooth process, reaching well toward tip of side-piece, slightly attenuated mesially, bearing at tip two articulated claws. Harpes elliptical, inner margin strongly revolute, tip recurved and dentated. Unci forming a basal cylinder. No basal appendages.

Life history and habits unknown.

Lesser Antilles, West Indies.

St. Thomas, Virgin Islands, August, 1905 (A. Busck).

Mansonia flaveolus is known only from the single type specimen. The wing scales greatly resemble those of *Mansonia titillans* in character, but the broad scales are proportionately smaller.

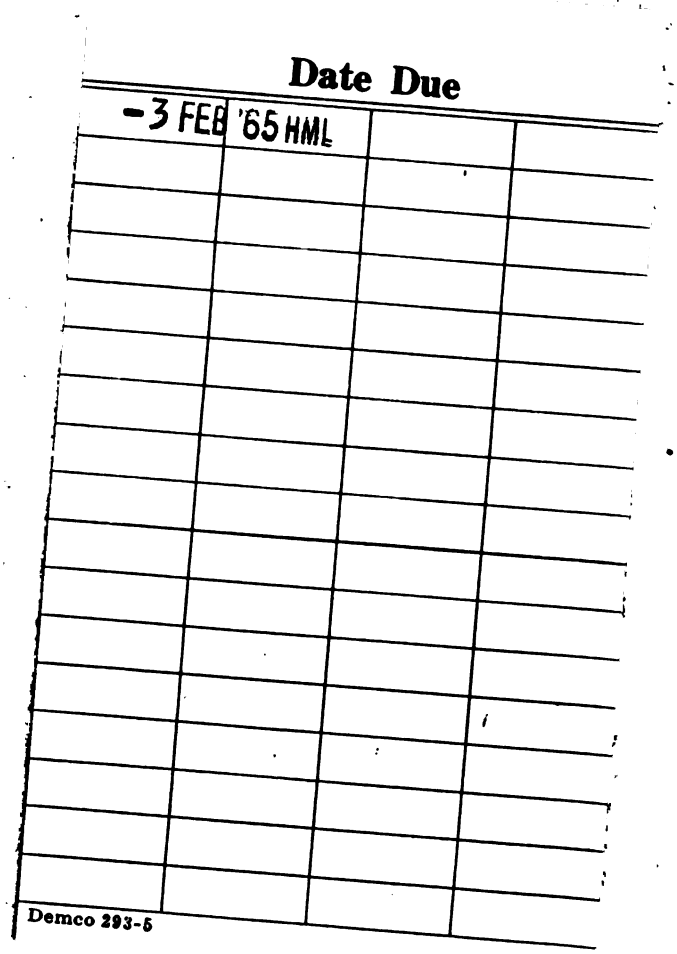
Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

COURTNAY LIBRARY
HC 2152



J. HOLZER
BINDER
BOSTON, MASS.

Digitized by Google

Digitized by Google